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ART. I. *On certain improved Methods of constructing Valves or Sluices, as applied to Canal and Dock Gates, &c., and similar Works of Hydraulic Engineering.* By ROBERT MALLET, M.R.I.A., M.S.C.E.I.*

ANY improvement which can be offered upon the known methods of retaining, and at will rapidly discharging, masses of fluid of considerable volume, cannot be looked upon as unimportant, when we reflect that upon the rapid and effectual performance of this apparently simple operation depends much of the speed of inland navigation, and of the useful management of our docks and harbours.

I have therefore ventured to bring before this Society the following considerations upon the methods at present in use in the construction of valves and sluices, as applied to canal and dock purposes chiefly; and to suggest the application of certain methods of formation of valves for these and similar purposes; which, I conceive, possess some not unimportant advantages over those now commonly used.

What I propose to effect, as contrasted with the present sliding sluice, is briefly this: —

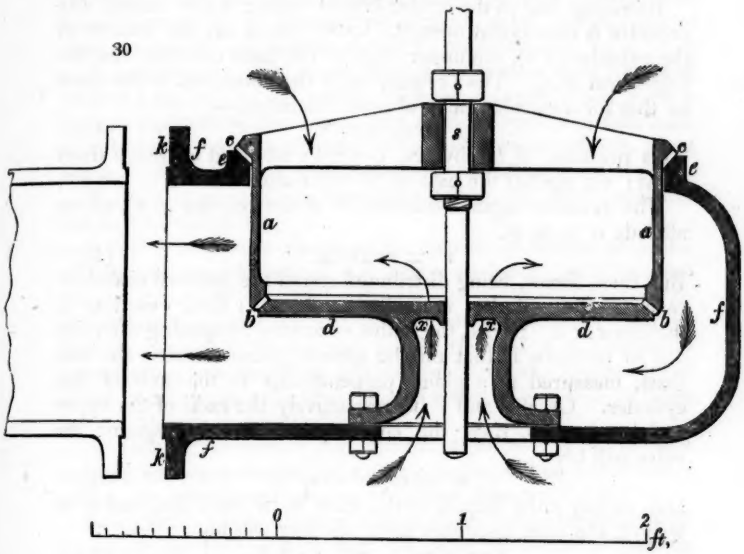
That whereas the sliding sluice is exposed to statical pressure over its whole surface, in proportion to its depth; so the friction of its sliding surfaces increases likewise, rendering it, at all depths, difficult of motion; and at considerable ones, either immovable, or impracticable of application at all. Hence, to open and close such sluices, mechanical arrangements of great power are required, involving complexity of structure, and proportionate loss of time; and, further, as usually made, they are difficult to preserve water-tight. Finally, they can neither be constructed nor moved in deep water beyond a very limited size.

* The following paper was to have been read at the last annual meeting of the Civil Engineers' Society of Ireland, but the reading of it was prevented by an unforeseen necessity of the author's absence.

The valves which I propose to substitute for them, on the contrary, are exposed to statical pressure on but a very small segment of their entire area; and at great depths, if desirable, *all* statical pressure may be removed or equilibrated: they can be moved with ease, however large, and with scarcely any mechanical combinations to effect their motion, consequently, with saving in time. They can be readily made absolutely water-tight; and can be increased in dimensions, almost without limit, without interfering with those properties. The principle of the valve now about to be considered is not new; but, to my knowledge, its application in the way and to the purposes I now propose has never before been made: this is all I mean individually to lay claim to.

About the year 1780, Hornblower proposed and applied to the expansive steam-engine, which he patented, a circular lifting-valve, *with two seats*, so arranged as to open with but little resistance when exposed to the pressure of high steam. It is unfortunate that this valve is not better known than it appears to be, combining, as it does, so many important advantages with great facility of execution. It can, however, scarcely be said to be known amongst the greater number of steam-engine makers, and is no where in extensive use but in Cornwall and South Wales, where it is commonly used in the nozzles of large engines.

Its general construction is as follows: — A metallic cylinder (*fig.* 30., *a a*), of given diameter and altitude, has got two ground conical valve-seats (*b b* and *c c*), one inside at its lower edge, the other outside near its upper edge. When the valve is closed, the lower end meets a fixed obstruction equal in diameter to the circular area of the cylinder (*d d*), at the same time that the upper seat (*c c*) is in contact with another obstruction, or annular ring (*e e*), projecting inwards from the valve-case (*f f*), or tube, within which the whole is placed, and to which these two obstructions are united, together closing up its whole area. The internal diameter of the valve-case (*f f*) is greater than that of the internal cylinder (*a a*), by a quantity such that the annular space betwixt the two cylinders shall be at least equal to that of the internal one. Hence, it is obvious that, when the latter is not in contact with the lower seat (*d d*), there is a free passage between it and the sides of the valve-case, and on through the centre of the inner cylinder; and, further, that when the latter is again brought into contact with the lower seat (*b b*), and at the same time (by our premises) with the upper seat (*c c*), all passage through is closed. This being understood, it is obvious that we have here got a valve differing in form from the common spindle-valve, but capable of performing all its functions, and possessing certain peculiar properties in addition. Let us



now consider the relations that will be found between a valve so made, and an ordinary lifting, or spindle, valve; and afterwards, a sliding, or draw, sluice, when exposed to statical pressure. Calling, then,

A = the area of any surface exposed to fluid pressure;
D = the depth of its centre of gravity immersed in the fluid;
s = the specific gravity of the fluid;

then, in all cases, we have the following equation for the pressure perpendicular to the surface pressed: —

$$P = DsA. \qquad (1.)$$

Hence, in the ordinary spindle-valve, omitting any correction for the *mitre* of the valve, and adopting the usual notation for the area of the circle in terms of the radius, we have

$$P = Ds.\pi r.^2 \qquad (2.)$$

and in a rectangular, whether sliding or lifting,

$$P = Ds.bl. \qquad (3.)$$

where b and l are the respective sides of the rectangular aperture.

If we take the values of A and D for units of area and depth, then s becomes equal the weight of a cube of the given unit, for any given fluid; and, taken in pounds avoirdupois, will be,

For fresh water = 62·5 lb.
For sea water = 64·2 lb. } at a mean temperature.

Referring now to the double-seated valve: when closed, the pressure is distributed upon the lower seat (*d d*), the interior of the cylinder (*a a*), the upper edge of the same cylinder, and the upper seat (*e e*). The pressure upon the lower seat is the same as that for a circular valve of equal diameter, —

$$P = Ds.\pi r.^2 \qquad (4.)$$

This pressure, it is obvious, is wholly resolved against a fixed point; viz. against the base of the valve-case.

The pressure against the interior of the cylinder (*a a*), whose altitude is = H, is,

$$P^1 = Ds.2\pi r.H.^* \qquad (5.)$$

But these forces, being distributed round the internal circumference of the cylinder, mutually equilibrate: their resultant is therefore = *o*. Hence, the entire resistance to opening the valve due to pressure is that on the *annular* space between the two seats, measured in a plane perpendicular to the axis of the cylinder. Or, if *r* and *r'* be respectively the radii of the upper and lower seats, then the entire pressure acting against the valve will be,

$$P'' = Ds(\pi r^2 - \pi r'^2): \qquad (6.)$$

and, calling F the friction of the valve in its seats, &c., and W its weight, the total resistance to its opening will be,

$$R = Ds(\pi r^2 - \pi r'^2) + F + W: \qquad (7.)$$

and as, by the property of the circle, its area

$$A = C\frac{r}{2},$$

C being its circumference, the proper lift for this description of valve, or the value of H, in Equa. 5., will always be equal to one fourth the diameter of the internal cylinder of the valve, with a small addition to allow for the contracted vein.

It is obvious, from the foregoing brief examination of its properties, that the force required to open a valve thus circumstanced is inconceivably less than that demanded to lift a common valve, or even to slide a common sluice against equal pressure. Indeed, *all* pressure may, if required, be removed from valves of this construction in various ways; either by causing the fluid to press upon the valve from its lower side, in which case its tendency will be to open it; or by equilibrating the pressure upon one valve by that upon a second in the opposite direction; or by a float, or various other expedients, that will readily occur. Or, finally, the pressure on the valve may be reduced to a negative

* In valves situated as those shown in *figs.* 38, 39., the entire pressure on the cylinder above the valve, or cast-iron tubbing, may be had in terms of that on the valve and seats. For if P' and P be those pressures respectively, then

$$P = \frac{P'2H.}{2r.}$$

H being the total altitude of the immersed tubbing; for,

$$P' : P :: 2r. : 2H.$$

quantity, so as just to equilibrate its weight and friction, and leave it movable by the smallest possible force. The value of this, practically, will best be shown by an example.

A square valve of 22 in. on the side of its clear aperture, and having a lap of 2 in. all round, to make it staunch, will have a surface exposed to pressure of $26 \times 26 = 676$ square inches; and, at a depth of 30 ft., will sustain a statical pressure (Equa. 3.) of about 8750 lb. in fresh water, or nearly *four tons.*

If it be required to be opened by lifting, this whole pressure has to be overcome.

But if it be a draw-sluice, or be opened by sliding, then the sliding surfaces, or lap of the valve, as before $= 192$ square inches. Hence, 676 : 192 :: the pressure on the whole valve : to the pressure on the lap; so that the pressure on the bearing faces is = about 2350 lb.; and, taking the results of Coulomb's experiments, one fourth of this will be nearly the friction, if the sluice be of oak on oak; or about one seventh, if of iron on brass ground facings, at first starting.

So that, in the former case, the actual force required to slide a sluice no larger than 22 in. square, of oak, will be $= 587{\cdot}5$ lb.; and in the latter case, namely, with brass faces $= 335{\cdot}7$ lb.

Now, fluids issuing from a sliding sluice are to be considered as subject to the contraction of the fluid vein, due to passing through a *thin plate;* but, from the formation of the valve now proposed, the issuing fluid, in all cases, will pass through a tube, or cylindrical aperture, of about two diameters in length. Hence, to produce equal expense in a given time, with a common draw-sluice and a double-seated valve, their areas must be in the ratio of the discharges through their respective kinds of apertures; and, adopting the coefficients determined by the experiments of Michellotti and Bossut, the area of the double-seated valve will be to that of the draw-sluice as 65 to 81 nearly.

Or, in other words, a double-seated valve of about one fifth less area will discharge as much in a given time as a draw-sluice. Hence, in the present example, a double-seated valve of 24 in. diameter will be more than equivalent to a sluice of 22 in. square.

Taking, then, the pressure on a valve of this size at 30 ft. in depth from Equation 6., and supposing the internal valve cylinder to be three eighths of an inch in thickness, the area exposed to pressure will be $= 27{\cdot}8$ square inches nearly, and the entire resistance to opening the valve due to pressure will be $= 357$ lb., at the *moment before the valve opens;* but, when it has opened the least portion, almost all pressure is relieved from it; whereas, in the draw-sluice, the resistance is as great when partly open as when closed; accordingly, the arrangement designed for open-

ing the double-seated valve is such as to give almost *an infinite power* at the commencement of the opening of the valve, as will be hereafter described.

It will further be observed, that, as the area of valves of this description increases, the ratio of $\pi r^2 . : \pi r'^2 .$ diminishes, so that the actual resistance becomes less in proportion as the capacity of discharge becomes greater.

The advantages, then, that I conceive to accrue from the substitution of these valves for common sluices are, —

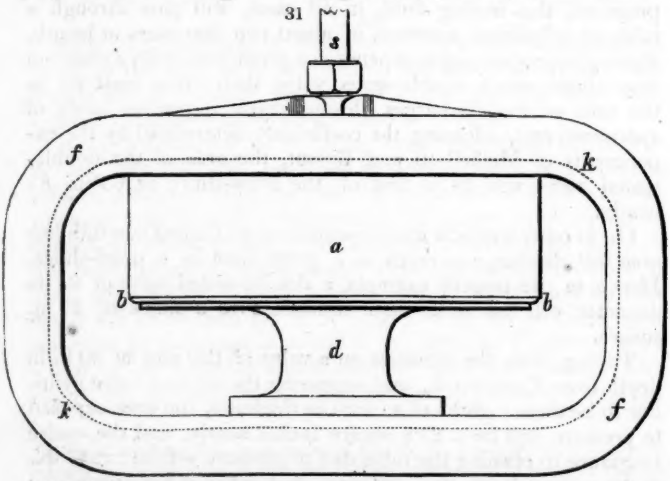
1st. Economy of original construction in large valves, and of wear and tear in all sizes.

2dly. Economy of labour in working them, and, consequently, in time.

3dly. The capability of using much larger apertures of discharge for canal and dock purposes than any at present practicable, and, hence, increased facility in the lockage of boats and getting of ships into dock, &c.

4thly. The ordinary sliding valve, or sluice, requires an amount of motion, to fully open it, equal to its entire diameter; whereas the double-seated valve, when fully open, has only moved a distance equal to one fourth of its diameter.

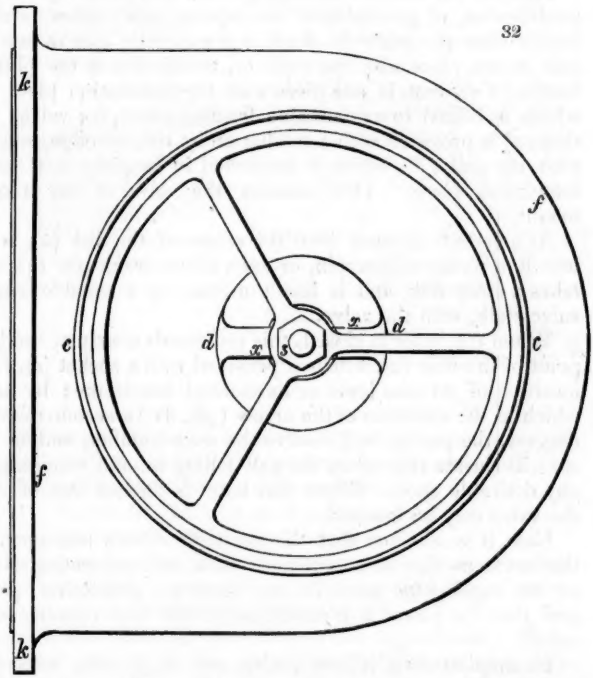
We will now proceed to describe the accompanying drawings of the valve in its various applications, together with the gearing proposed for moving it. In *figs.* 30, 31, and 32., a double-



seated valve of 24 in. aperture is shown, in vertical section, plan, and elevation, as arranged for application to dock or canal lock-gates, dams, &c., where the valve-case is secured to the retaining

medium, whether gate or other thing, by the flange *k k*. The same letters refer to *figs.* 30, 31, and 32. *f f* is the valve-case, a single casting in loam; to which the lower valve-seat (*d d*), is secured by bolting: *a a* is the movable part of the valve, or inner cylinder, having its two seats (*b b* and *c c*) faced with brass. These are fitted staunch to the corresponding seats of the valve-case, by turning and boring, and subsequent grinding. *s* is the wrought-iron valve-stalk, communicating with the gear by which motion is given to the valve: its lower part forms a guide to the valve, passing through a bridge (*x x*) across the hollow neck supporting the lower seat. When the valve is open, the fluid

32



takes the course indicated by the arrows; passing downwards through the internal cylinder, upwards through the hollow neck of the lower seat, and laterally through the flange *k k*, and whatever it may be secured to. In the plan exhibited in *figs.* 36. and 37., valves thus circumstanced are shown applied to dock-gates of the largest class. It will be seen that they in no way interfere with the framing, within which they lie very conveniently.

Two valves are here shown in each gate; but it is obvious that five valves might be readily placed in each, without diminution of strength, or any considerable increase of complexity; thus opening simultaneously a united aperture of discharge in the pair of gates of *forty circular feet in area;* an amount that could be, probably, in no way obtained by sliding sluices, without immense sacrifice of strength in the gates, and of labour in working.

When the principle of the working gear for these valves is described, this plan (*figs.* 36. and 37.) will be sufficiently clear without further explanation.

Figs. 33, 34, and 35., belonging to the first plan, represent the modification of gear adapted for moving small valves, and will render clear the principle of all. *a* is a circular disk of cast iron, cast in one piece with the shaft (*b*), which lies in the plummer blocks (*d d*), cast in one piece with the foundation plate (*e e*), which is bolted to any suitable framing above the valve. The disk (*a*) is provided with a ratchet on its rim, or edge, engaging with the pall (*f*), which is supported in bearings cast on the foundation plate. This sustains the valve at any required height.

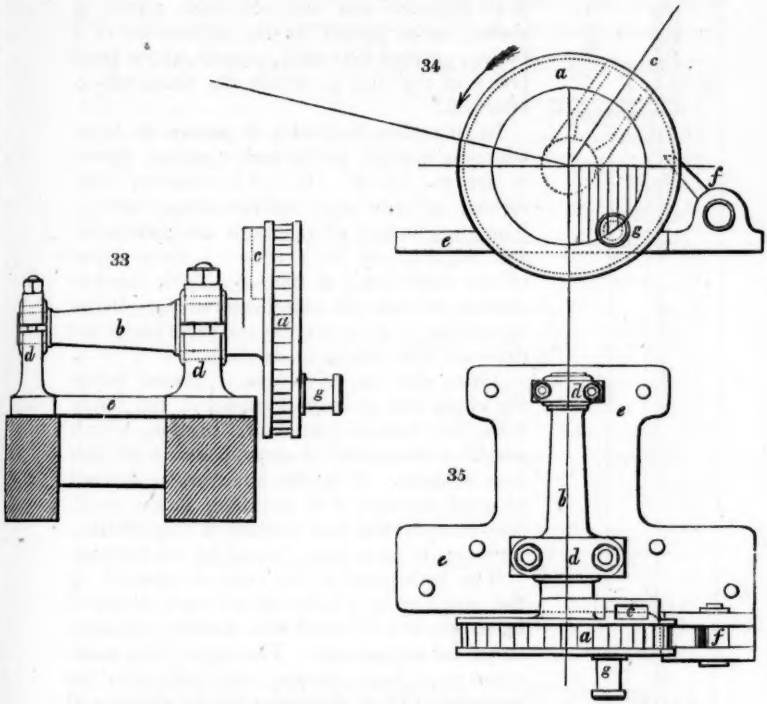
At a certain distance from the centre of the disk (*a*), is fixed into it a wrought-iron pin, or axle, like a crank-pin (*g*), which takes a strap-link, and is finally united, by a suitable length of valve-stalk, with the valve.

When the latter is closed, this pin stands nearly at the lowest point of the disk (*a*), which is provided with a socket (*c*), for the insertion of an iron lever or hard-wood handspike; by turning which in the direction of the arrow (*fig.* 34.) a certain number of degrees, the pin (*g*) will revolve the same number, and, in doing so, will elevate the valve, the pall falling in, and retaining it at any desirable spot. When this latter is thrown out, of course the valve may be lowered.

Now, it is obvious that the principle of this arrangement is the same as that of a common crank and connecting-rod, or of the *toggle-joint* used in the Stanhope and other presses, and that the power is a maximum at the first opening of the valve.

Its simplest form is here shown, and in *fig.* 37., referring to the same letters, where it is nothing more than a lever with a variable purchase. In *fig.* 37., a winch is used in place of a handspike.

If, in the arrangement thus described, we suppose the crank-pin at the lowest point, and call F the force in the tangent, or that applied to the lever, and tending to turn round the crank-pin; and T and T′, the resistance to opening of the valve, and the strain in the line joining the crank-pin with the centre of motion, respectively; then these three forces will be analogous



each to the sine of the angle contained by the other two: and, if we assume T=T′, and take *a* to represent, in this case, half the angle contained by these forces, then we have,

F : T :: *sin.* 2*a* : *sin.* *a*. or :: 2 *cos.* *a* : 1.

and F=2 T *cos.* *a*.

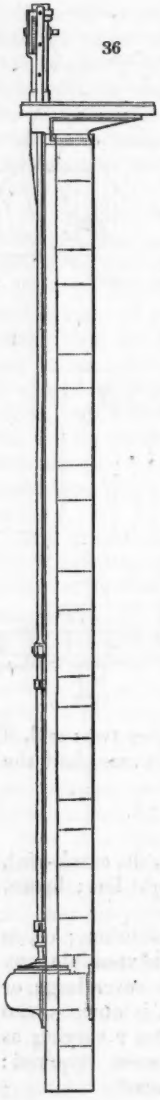
But, in the case assumed, the centre of motion (the crank-pin), and centre of gravity of the valve, are in one right line; hence,

$a=90°$ and *cos.* $a=0$.

and, therefore, F infinitely less than T for equilibrium; or, in words, if the valve-stalk, &c., were absolutely inextensible, any force, however small, would open the valve, however large or heavy. This, from the properties of matter, it is obvious, can never be so in practice. But it will be seen that F varying as *cos.* *a*, the power is a maximum when it is most required; namely, when the valve is first raised from its seats.*

* Tredgold has shown that, if *a* be the angle the valve-stalk, or connecting-rod, forms with (in the present case) the vertical, *c* the angle described by the pin *g*, counted from the lowest point, then,

P *sec.* *a* = the force in the direction of the connecting-rod;



In *figs.* 38. and 39., additional power is shown to be gained by the application of a pinion, gearing into teeth, placed on the periphery of the disk to which the crank-pin is attached.

In this plan the valve is shown at large which is applied to the lock-chamber shown in *figs.* 40. and 41. It is 6 ft. diameter, and formed of cast iron without brass facings. The same letters of reference are used as in *figs.* 30, 31, and 32.; and the construction of the valve itself is the same, with the exception of wrought-iron diagonal stays being introduced (*n n*), to prevent the valve under the pressure from changing its shape.

Here, also, the valve-case is formed below the upper seat entirely of masonry; but above that, the vertical tunnel, or conduit, which would be always full of water, is shown of cast-iron tubbing. It might, however, be formed of good masonry with puddling at the back. The cheapest and best method of construction, however, in most cases, would be the tubbing.

The lower seat of the valve is secured to the masonry by a large ribbed plate cramped in, to which it is bolted with suitable chipping strips for adjustment. The upper seat is secured to a large circular ring built into the masonry (*f f*), to the upper side of which, and upon which, the tubbing rests. The water enters the vertical tunnel over the valve from the upper level, or lock, by the conduit *y*, and passes off from under the valve by the other conduit *z*. The latter, except when the valve is open, will be always empty, and affords the means of getting in under the valve, at any time, to examine it as to staunchness, &c.

The central support of the lower valve-seat is a short hollow column, with radial ribs to stiffen the bottom plate (*d d*). It will be seen that adjustments are provided for every part of the valve in its place, and that the arrangement admits of the utmost facility in getting at the valve above or below. The valve-stalk (*s*),

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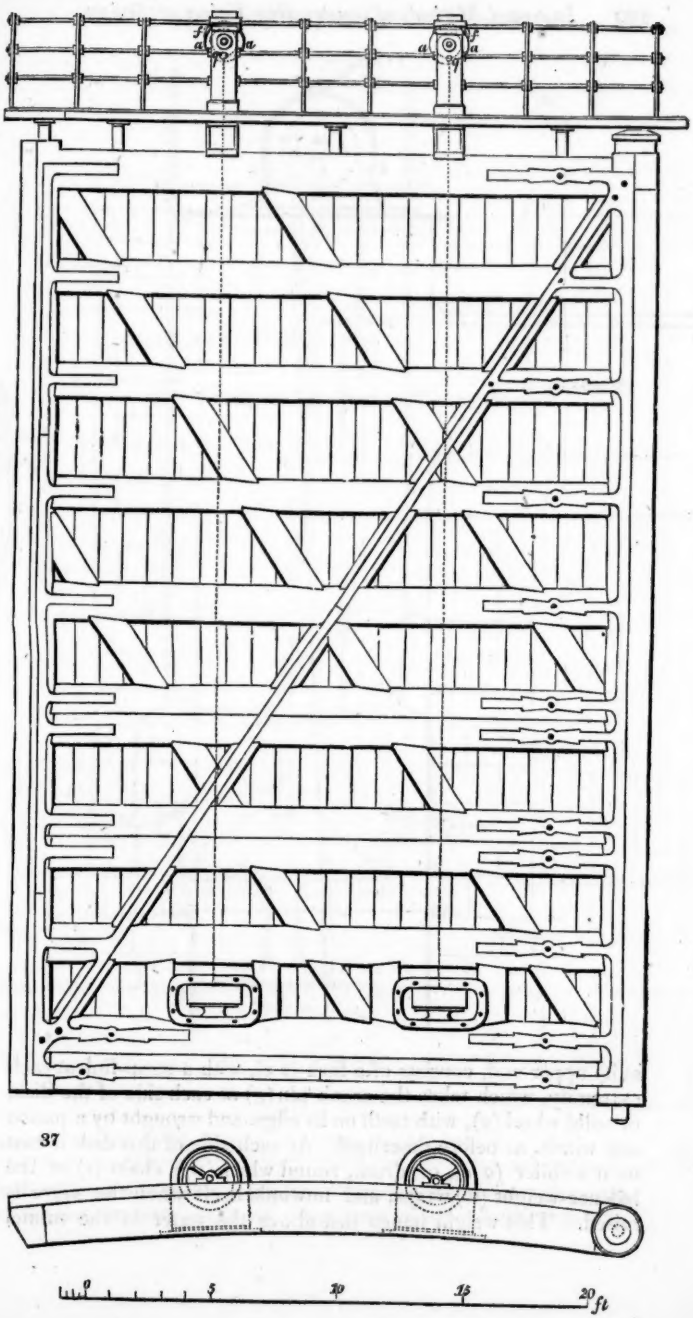
and, when the length of this rod is *n* times the distance of the pin *g* from the centre of motion,

$$P.\ sin.\ c. \left(\frac{cosin.\ c.}{\sqrt{n.^2 - sin.^2\ c.}} + 1 \right) = \text{the force at any angle, } c.$$



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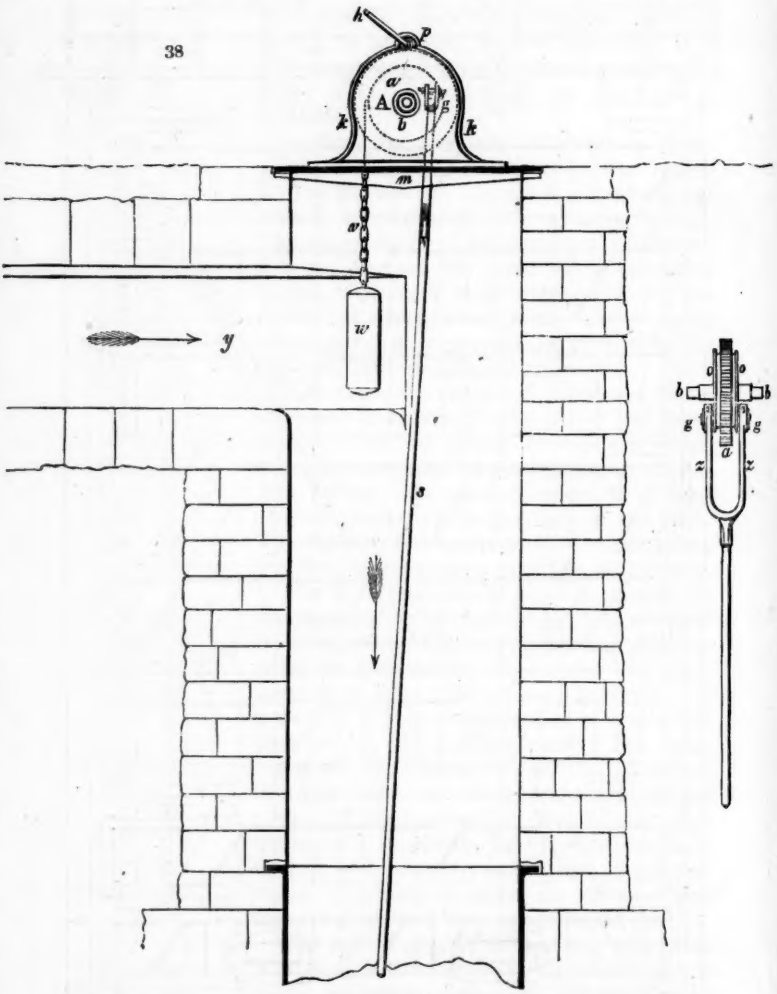
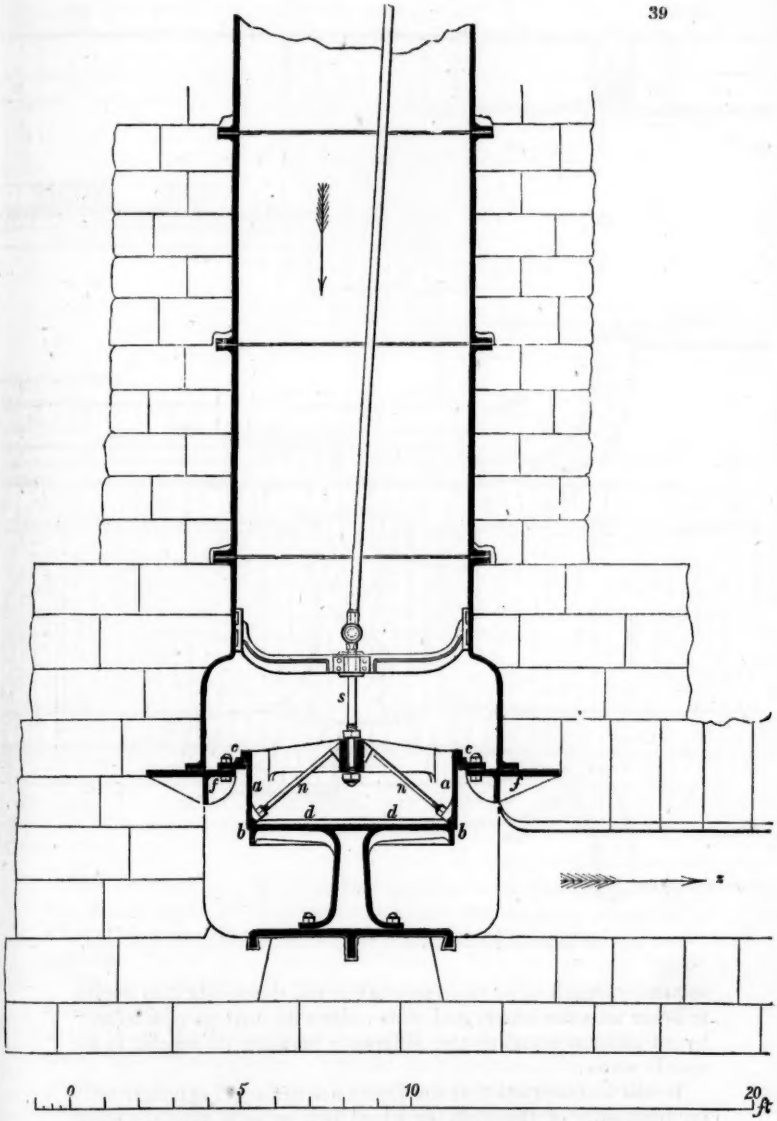
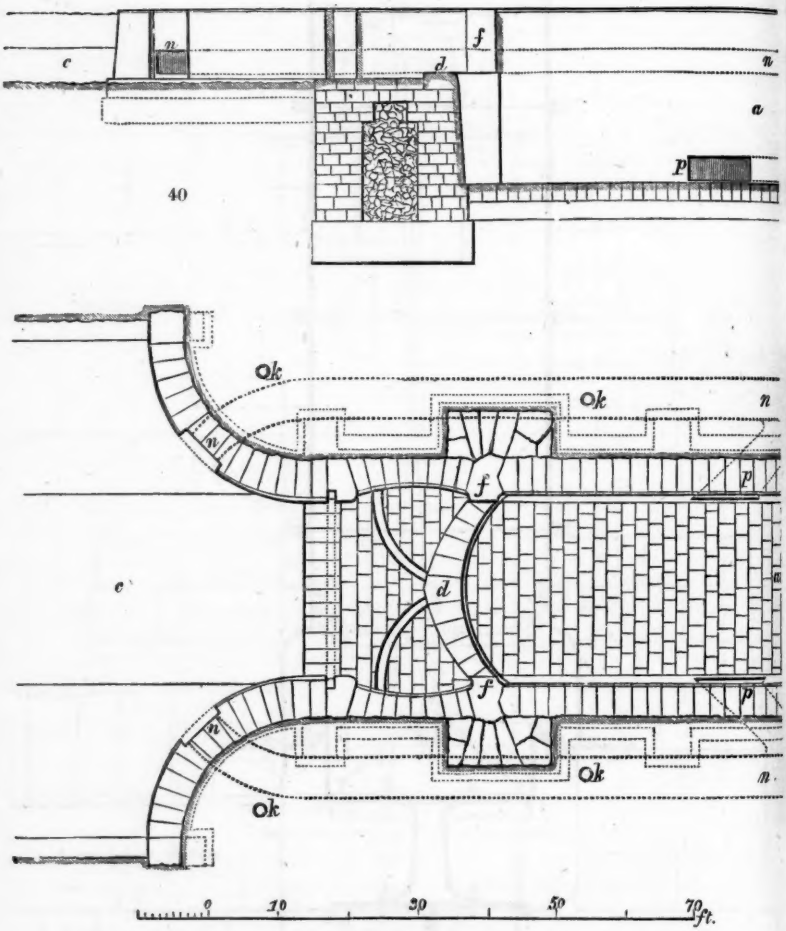


at its upper end, consists of a fork (*z z*), with a strap-link at each extremity, which takes the crank-pin (*g*) at each side of the disk, or solid wheel (*a*), with teeth on its edge, and wrought by a pinion and winch, as before described. At each side of this disk is cast to it a roller (*o o*), or drum, round which the chain (*v*) of the balance-weight (*w*) wraps, and unwinds itself when the valve is raised. This weight hangs just above the water in the tunnel

39



and relieves the moving power of the weight of the valve and stalk; but, as soon as the valve has been raised a little, and, con-

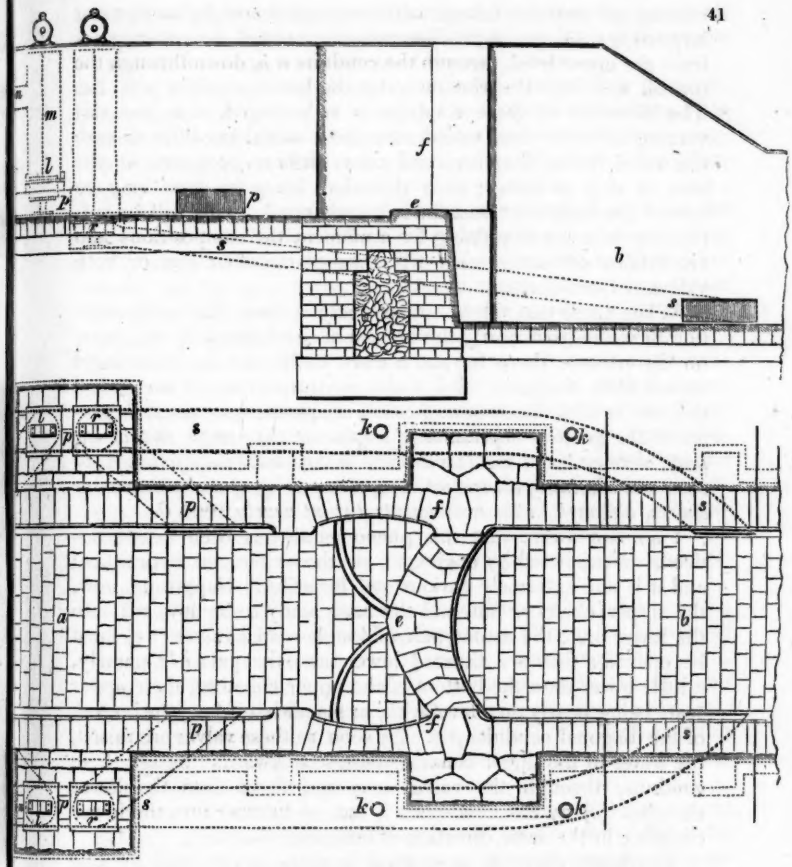


sequently, much of its resistance taken off, the weight also begins to lower into the water, and thus reduce its own preponderance by an amount equal to the difference between its weight in air and in water.

It will be observed that the forces are arranged symmetrically on both sides of the disk, or wheel (*a*), so as to produce equal stress upon both ends of the shaft (*b b*).

The pall for retaining the valve up is on the same shaft with the working pinion, and falls into the teeth of the disk-wheel.

41



We now come to describe the application of this in *figs.* 40, 41., which represent, in plan and section, the masonry of part of a canal double lock of a large class, to which these valves are applied.

The same letters refer both to plan and section: *a* is the upper lock-chamber; *b*, the lower one; *c*, the forebay of the upper lock; *d*, the sill of the upper gates; *e*, that of the lower ones; *f f f*, &c., being the hollow quoins. I would here premise, that I do not profess to bring this sketch forward as an example in point of masonry, &c. (in which, however, I believe there are no palpable blunders); but merely as the vehicle for showing the intention of these new valves. *l l*, &c., are the double-seated valves for admission of the water into the upper lock-chamber, to fill it: they

are situated near the bottom of the vertical tunnel *m*, as shown at large in *figs.* 38, 39. When these valves are raised, the water passes from the upper level, through the conduits *n n*, down through the tunnel, and into the chamber, by the lower conduits *p p*, &c. The direction of these conduits is so arranged, that the vast volume of water they would pour forth would but little disturb the water in the chamber, and cause little or no motion to the boat or ship in rising; their directions being in what may be termed the lines of "least fluid disturbance." This will be sufficiently seen by examining for a moment the compositions and resolutions of motion that will take place when one or both valves (*l l*) are opened.

When these two valves are suddenly opened, the rapid eduction of water from nearly the bottom of the forebay (*c*) will cause no disturbance there beyond a mere eddy; for, in some large experiments formerly tried under my inspection, it was found that the sudden opening, in a canal, of apertures so situated, *produced the greatest depression of surface at the remote end of the level, however long; and this depression instantaneously followed, or even was absolutely coincident with, the opening of the apertures, or sluices, although in the experiments distant nearly* 1000 *ft.*

I am not aware that this phenomenon has been before noticed, or predicted by engineers, or the writers on hydraulics; and it is one extremely curious and beautiful. Supposing, now, the upper chamber full, and the boat ready to be lowered into the lower one; the second pair of double-seated valves (*r r*) must be opened: they are situated lower than the pair *l l*; namely, a little lower than the bottom of the upper chamber, their upper seats being nearly on a level with, or somewhat below, the bottom of the diagonal conduits *p p*. As soon as these valves are raised, the water in the upper chamber passes backwards through these conduits, through the valves *r r*, and down into the lower chamber (*b*) by the conduits *s s*, &c., delivering into the lower chamber in the same direction of least disturbance.

The lower chamber is emptied into the lower level by one other pair of double-seated valves, nearly like the last pair described.

Thus, in place of having 18 *sliding sluices to raise and lower* (a common number for double locks, there being usually, to each pair of gates, 4 gate and 2 land sluices), 6 *valves do the whole work*. In place of the greater body of the water being discharged over the gate-sills into the chamber, and often wetting the boat and cargo, it is all discharged quietly, and in vastly increased volume, into the bottom of the chambers.

It is proposed here to have no sluices at all in the gates; thus enabling the latter to be made stronger and cheaper, and occasioning them to need fewer repairs.

In the upper conduits (*n n*), seats for temporary wood sluices

are provided, by sliding in which any of the valves can be got at, either above or below; and any repair, &c., executed, without running off any level, or stoppage of the navigation.

The filling and emptying sluices being nearly close together, little time will be lost in running from one to the other, as is usually the case. *k k k*, &c., are the situations of the crabs, capstans, or other means necessary for opening and closing the gates, as ordinarily in use.

I should have mentioned earlier in this paper, that one of the important advantages of these valves over sliding sluices is, that, whereas the latter require nearly as much force to shut them down as to open them, the double-seated valves shut themselves, or fall by their own weight and the pressure of the fluid; thus, in this particular alone, abridging the labour *one half*.

It is obvious, in the arrangements of these valves just described, that the full of the tunnels *r r* will be wasted at each lockage. In many cases, this will be of no importance; but, where economy of water is to be observed, a plate of cast iron, or diaphragm, may be placed horizontally across the tunnels *r r*, just above the level of the top side of the conduits *p p*, having a small tube or pipe of cast iron projecting upwards from its centre, just sufficient to carry and allow free play to the valve stalk: by this means, instead of the whole tunnel being filled at each lockage, merely this small pipe will be so.

An example of the practical importance of all this may be given. On the Royal Canal leading from Dublin to the west of Ireland there are about 40 locks, each something about 70 ft. long by 15 ft. wide: a boat *may* be passed through one of these double locks, by having a man to each sluice, in about $3\frac{1}{2}$ minutes; that is, by having about ten men employed in the lockage: but the average time of the passage of each boat exceeds 6 minutes, and is often 8 or 10 minutes.

Now, the total apertures of the 6 sluices in and at one pair of gates is about, or perhaps under, 10 ft. square: by using these valves, a total aperture of 60 square feet could readily be provided; and as, under the same head of water, the times of filling will be inversely as the apertures of discharge, the time of passing a boat through a double lock would be reduced to one sixth; or five sixths of the time consumed in lockage on the whole line would be saved; thus giving on the whole line, supposing the number of locks to be 40, *a saving in time of 3 hours and 20 minutes.*

Hitherto, I believe, large sluices to lock-chambers have never been attempted any where but on the Ellesmere Canal: there the sluices draw from the forebay, and discharge into the chamber *under* the sill of the gates; but they are common wood sliding sluices, and must be very unwieldy in use, and liable to

accident. It will be admitted readily, that no difficulty is likely to arise in the application of these valves in original construction; neither is there any difficulty in substituting them for the common sluices now in use on lines of canal already constructed, and that without any material obstruction to the navigation. And, should it appear that these valves do really possess the advantages which I fancy I have shown them to have, there never was a time when canal proprietors were more called upon to take advantage of this or any other improvement upon their means of rapidly transmitting goods, &c.

Before concluding the present subject, I am desirous of describing a new arrangement of gearing for opening and closing large lock or dock gates. It is well known that the usual method of effecting this object in British engineering is by means of crab windlasses acting upon chains made fast to the gate, the windlasses being placed on the land.

By this arrangement, it is necessary to have for each pair of gates 4 complete crabs (or 12 for a double lock), besides expensive tunnels for the chains to run in, armed with friction rollers wherever the chain deviates from a right line. In one word, the method I am about to propose may be said to consist, in principle, in inverting all this. I attach the chains for opening and closing fast to the masonry, and make fast the moving power to the gates: by this means I save all tunneling. There are but two points of application of labour for opening or closing, in place of four; and I save all need of friction rollers, and a considerable length of chain, besides so reducing the number of moving parts as to effect, as I conceive, a considerable economy both in original cost and in repairs. This arrangement is represented in detail in *figs.* 42, 43, 44.; *fig.* 42. being a plan of one of a pair of gates so fitted up; and *fig.* 44. an elevation of the gearing in a line transverse to the gates. *a a* is the top rail of one gate: *b*, the heel-post, secured to the masonry by a slight modification of the admirable method adopted by Mr. Jesse Hartley for effecting that object at the new Liverpool Docks: *c c* is the collar-strap, which takes the heel-post, secured by two screwed ends through the large block of cast iron *d d*, which is provided with two dove-tailed slots (*e e*), in which are laid the ends of the flat bar *f f*, which is of iron 4 in. × 1 in., bent round in the form shown, and let down on edge its own depth into the stonework of the hollow quoin, and leaded therein; this giving a solid and most effectual hold of the stonework, and in the best position both for it and the iron: *g g* is the gangway, or passenger platform, usually provided over lock-gates, and which in this case is made available as the situation for working the moving gear: *h h* is the handrail: *i*, the cast-iron saving-plate, or nosing, for the planking of the platform. The cast-iron brackets, or cantelevers,

which sustain this platform at a height of a few inches over the top rail of the gates, are not shown, to avoid confusion in the figure. *k k* is the sill-piece of the gate, sustained by the horizontal stone arch *l l*, to which the timber is secured by copper clenched bolts (*m*); *n* is the roller plate; and *o*, the roller box and roller. The vertical rod, or socket wrench, which proceeds from the top of the bearing screw over the roller, is not shown, to avoid confusion: its object, it is well known, is to set down the roller upon the roller quadrant plate, and relieve the gate off the sill.

We now come to the new gearing. *p p* are two chain barrels, one fixed in suitable bearings at each side of each gate, and secured to it by bolting their frames and plummer-blocks back to back right through.

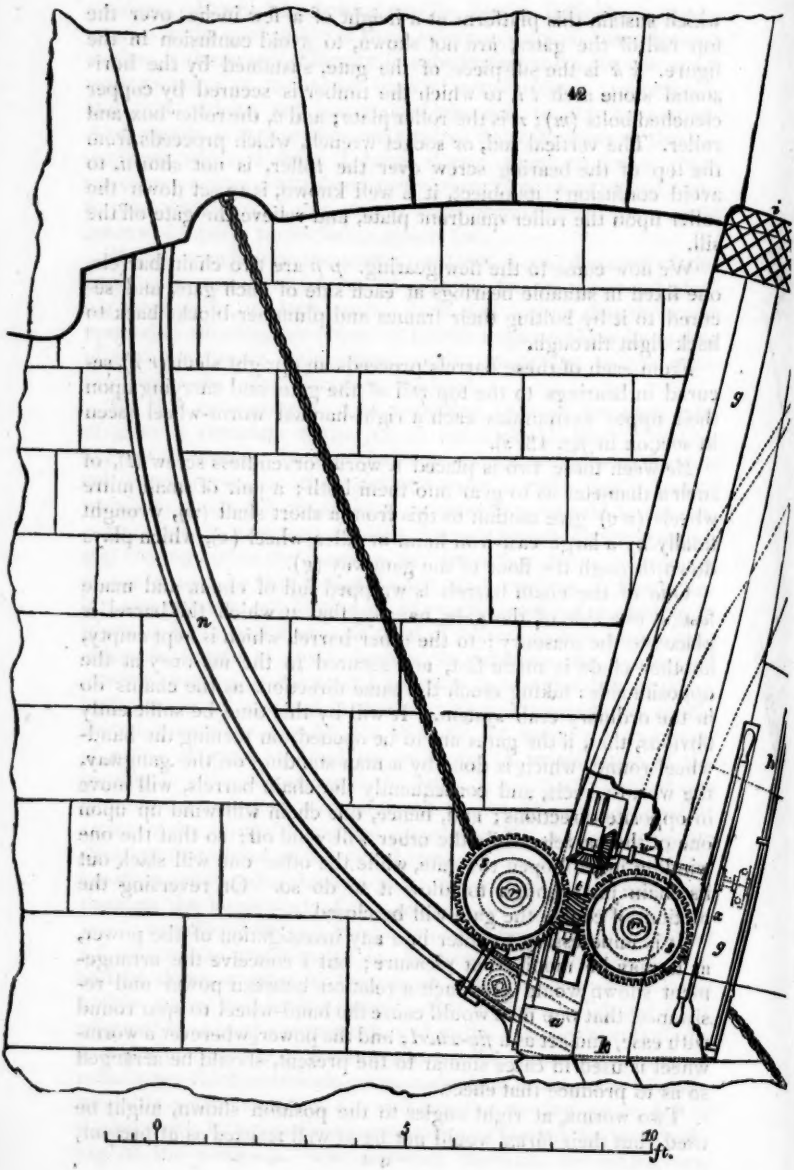
From each of these barrels proceeds an upright shaft (*r r*), secured in bearings to the top rail of the gate, and carrying upon their upper extremities each a right-handed worm-wheel (seen in section in *fig.* 43. *s*).

Between these two is placed a worm or endless screw (*t*), of such a diameter as to gear into them both; a pair of small mitre wheels (*v v*) give motion to this from a short shaft (*w*), wrought finally by a large cast-iron hand or tiller wheel (*x*), which plays down through the floor of the gangway (*g*).

One of the chain barrels is wrapped full of chain, and made fast at one side of the gate, namely, that at which the barrel is placed to the masonry; to the other barrel, which is kept empty, another chain is made fast, and secured to the masonry at the opposite side: taking much the same directions as the chains do in the ordinary crab system. It will by this time be sufficiently obvious, that, if the gates are to be opened, on turning the hand-wheel round, which is done by a man standing on the gangway, the worm-wheels, and consequently the chain barrels, will move in opposite directions; and, hence, one chain will wind up upon one of the barrels, while the other will wind off; so that the one winding up will open the gate, while the other one will slack out its chain just enough to allow it to do so. On reversing the motion, of course the gate will be closed.

It is unnecessary to enter into any investigation of the power, as it may be modified at pleasure; but I conceive the arrangement shown would give such a relation between power and resistance, that one man would cause the hand-wheel to spin round with ease, and act as a *fly-wheel;* and the power, wherever a worm-wheel is used in cases similar to the present, should be arranged so as to produce that effect.

Two worms, at right angles to the position shown, might be used; but their *thrust* would not be so well resisted as at present,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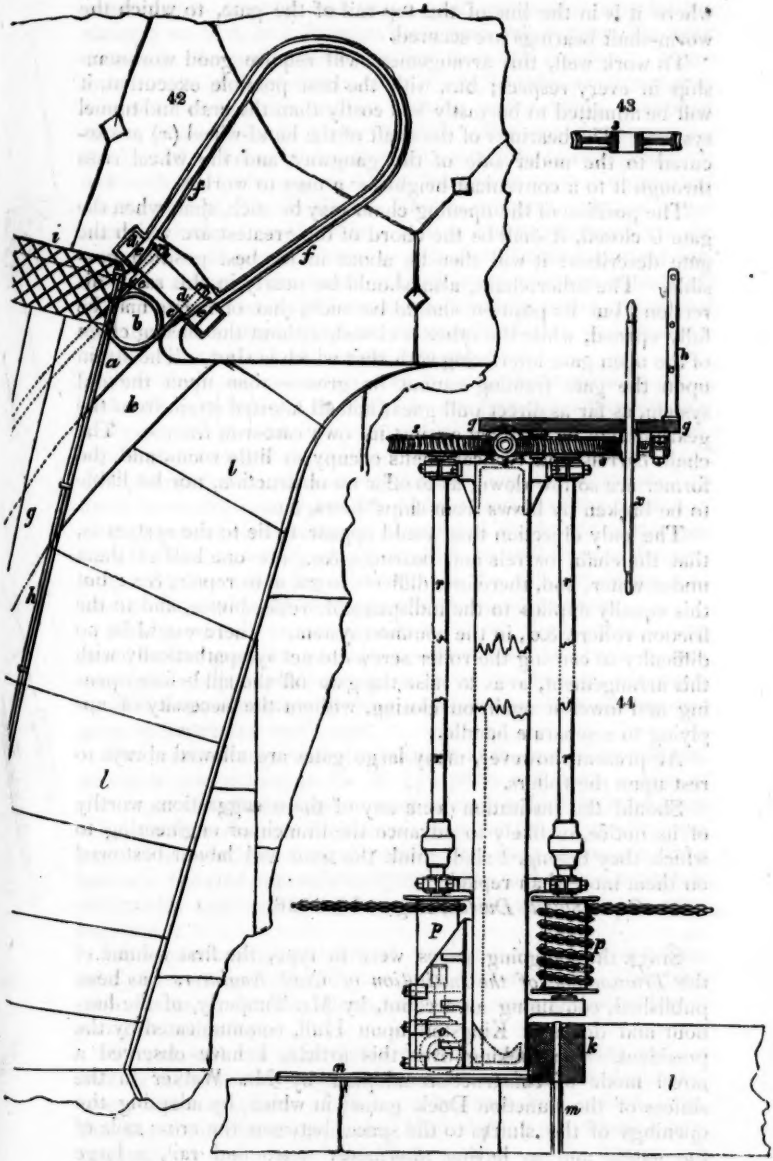
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where it is in the line of the top rail of the gate, to which the worm-shaft bearings are secured.

To work well, this arrangement will require good workmanship in every respect; but, with the best possible execution, it will be admitted to be vastly less costly than the crab and tunnel system. The bearings of the shaft of the hand-wheel (x) are secured to the under side of the gangway, and the wheel rises through it to a convenient height for a man to work it.

The position of the opening chain may be such, that, when the gate is closed, it shall be the chord of the greatest arc which the gate describes: it will then be about in the best position possible. The other chain, also, should be nearly in this same direction; but its position should be such, that one gate may be fully opened, while the other is closed, without the closing chain of the open gate interfering with that which is shut. The strain upon the gate framing cannot be greater than upon the old system, as far as direct pull goes; and all internal strain from the gearing may be resolved against its own cast-iron frames. The chain barrels and vertical shafts occupy so little room, and the former are so low down, as to offer no obstruction, nor be liable to be broken by blows from ships' bows, &c.

The only objection that would appear to lie to the system is, that the chain barrels and bearings, &c., are one half of them under water, and, therefore, difficult to get at to repair, &c.: but this equally applies to the indispensable roller-boxes, and to the friction rollers, &c., in the common system. There would be no difficulty in causing the roller screws to act sympathetically with this arrangement, so as to raise the gate off the sill before opening and lower it again on closing, without the necessity of applying to a separate handle.

At present, however, many large gates are allowed always to rest upon the rollers.

Should the Institution deem any of these suggestions worthy of its notice, or likely to advance the branch of engineering to which they belong, I shall think the time and labour bestowed on them more than repaid.

94. *Capel Street, Dublin, August* 12. 1836.

SINCE the foregoing pages were in type, the first volume of the *Transactions of the Institution of Civil Engineers* has been published, containing an account, by Mr. Timperly, of the harbour and docks of Kingston upon Hull, communicated by the president. On looking over this article, I have observed a novel mode of construction adopted by Mr. Walker in the sluices of the Junction Dock gates; in which, by adapting the openings of the sluices to the spaces between the cross rails of the gates, and so having alternately space and rail, a large

water-way is obtained, with but a small range of motion for the sluices; so that, as it is said, "one man can perform the work of two; in the ordinary way, in less than half the time. There are two sets of these sluices, placed side by side, which act contemporaneously; the original moving power being a vertical screw, wrought by an auger handle. Perhaps this is making the best of a sliding sluice that the principle is susceptible of; and such was to be expected from the design of so distinguished an engineer as Mr. Walker. I must, however, venture to retain my belief that the valves I have above proposed are far superior, in all respects, even to this best of sliding sluices; for, first, the sluices of the Junction Dock gates, as shown in plate 11. of the *Transactions of the Institution of Civil Engineers*, gave a total aperture, when open, of about 45 superficial feet, and require a range of motion of 15 in. in the vertical.

Four double-seated valves in each gate, which could be put in without injury to their strength in any way, all acting simultaneously, and moved by one man, with only a range of 9 in., would give an equal expanse.

The upper slide of each of these sluices is not exposed to much more than two thirds the entire pressure of the column of water; and, as it stands nearly one third the height of the gate from the bottom, would *spout* from 15 ft. to 18 ft. clear of the gate, supposing the water outside level with the sill; rendering this kind of sluice altogether inapplicable to canal purposes.

If the proposed valves were used, all of them would be exposed to the greatest possible pressure, until the basin or lock was quite empty; and, being close to the bottom, the water could not spout to any distance, so as to endanger wetting cargoes, or swamping small craft.

The vertical range of these sluices is 15 in., moved by a screw, which, if we suppose to be of $\frac{3}{4}$ in. pitch, will take a man at the auger handle at least a minute and a half to raise them fully, or three minutes for the two gates, and the same for closing. The principle, also, of subdividing each sluice into three increases the rubbing surfaces by *two fifths*, and adds a multitude of shackles and joint pins, &c., and other parts liable to wear and tear.

Whereas the proposed valves would be raised by one man, nearly instantaneously, and closed without any effort. They have no rubbing or bearing parts, and are scarcely susceptible of going out of order.

Comparisons are at all times, perhaps, odious; but, without making comparisons, it would often be difficult to decide between better and best. I do hope, however, and, indeed, trust, that the observations upon the Hull dock gates which I have ventured to make will have their motive rightly interpreted,

They are made with the highest respect for Mr. Walker as an engineer; and with no object in view but the matter in hand, viz. the advancement of civil engineering. — R. M.
March 14. 1837.

ART. II. *The first Christian Church.* By H. N. HUMPHREYS.

SAN GIOVANNI LATERANO, near the gate of the same name in Rome, on the road to Naples, is generally allowed to be "the first church," the first building ever publicly consecrated and devoted to Christian worship; in short, in the words of the old priest who accompanied me, *la prima chiesa del mondo*. Its claim, however, may be, to a certain extent, fairly disputed. The predecessors of the royal convert, Constantine, had occasionally, as it suited their policy, granted permission to the Christians, already a numerous and influential sect, openly to perform the ceremonies of their religion; and, during these fitful snatches of toleration, many small Christian temples were erected in Rome, which might, did they still exist, dispute the palm of precedence with the splendid Basilica Constantina. Among others, Santa Maria in Trastevere occupies the site of a deserted hospital, which Septimius Severus allowed to be used by the Christians as a church; not to mention the churches already established in the East by the apostles and their followers, which certainly would take precedence of San Giovanni Laterano.

But Rome, all-ruling Rome, was the only point from which the light of the true religion could irradiate with commanding advantage; and, until the great city became its centre, under the converted emperor, the progress of the faith had been slow and difficult, and its struggles best marked upon the page of history by a streak of blood. The miraculous conversion of Constantine shed a new and unexpected glory upon its meek and lowly followers. One of the first acts of the imperial zeal was the erection (about the year 324 of our era) of a splendid basilica, worthy of the sublimity of the faith the emperor now professed: it was raised near the spot where he was baptised by St. Sylvester, the chief priest, or pope, of the Christians; a post which had been filled, since the crucifixion of Peter under Nero, by an uninterrupted line of martyrs. This basilica, so named from the form adopted being that of the basilicæ (Roman courts of law), arose with all the splendour that the spoils of the richest buildings of Rome could afford; for, though the arts were already sunk (sculpture and painting had departed), architecture was the last to fall; and, by selecting the most superb columns, and the richest decorations of the royal palaces and public buildings, and lavishing a profusion of the rarest

marbles, gems, bronzes, and gold, a structure was produced which well merited its title of *Aurea*. It was dedicated by Constantine to the Saviour; but, as corruptions and misconceptions crept into the Romish church, Catholic etiquette in the seventh century demanded that it should be placed under the protection of a saint, St. John the Baptist was the chosen patron; and the name of the Redeemer has disappeared before that of the saint. This superb edifice existed one thousand years, respected by the Gothic hordes of Alaric and Oderic, before whose destroying hands the glories of Rome faded to dust. It was at last destroyed by accidental fire in the year 1808, during the temporary residence of the popes at Avignon. Clement V. immediately despatched agents to Rome to reestablish the venerated pile; for nothing remained but a small chapel, now called the Sanctum Sanctorum, of the church from which the Christian faith had already spread over all civilised Europe. The old and adjoining palace of the Lateran, too, was destroyed, where councils had been held, and whence decrees had issued, upon which the existence and extension of the Christian religion had long depended; and where was woven that vast web of power which the mighty papacy at length cast over Europe; urging its warlike nations to deeds which, as they fade into the more distant dimness of the past, will appear more wild and fabulous than any legend of the ancient world.

The new building occupied the precise form and situation of the original; but, under the direction of the architects of the day, Gothic arches met in their elegant and fretted groinings above the gigantic Corinthian columns of Constantine, which were still left standing. But this anachronism did not, perhaps, produce a disagreeable effect, for the Gothic of Italy was unlike the Gothic of the north: a shade of the antique was still preserved in its minor ornaments, and in the almost classic capitals of its twisted columns. It had something of the Moresque and Saracenic in its lightness, which would accord much better with the Grecian columns, than the deeper and more massive Gothic of the northern countries of Europe; and it must, with the splendid additions of painting, gilding, sculpture, and drapery, of which the Romish church so well understood the effect, have been an impressive building, as, indeed, are all the Gothic cathedrals of that age: but it is now Gothic no more. In the reign of Innocent X. it had become, in part, ruinous; and the columns of the principal aile were deemed too slender for the support of the roof, or, rather, the rage for modernisation was then in the height of its career of destruction. The beauties of the Greek and Roman architecture had, after the long slumber of art in the dark ages, begun to be justly appreciated; and that appreciation, in the course of a century or two, became a rage:

not a Gothic church in Rome could be left to the repose of the rich twilight of its painted windows, shedding

"A dim religious light;"

and, as Walpole, or some one else, said, "They built the modern churches of Rome with the money extracted from the devotion inspired by her Gothic ones." San Giovanni Laterano shared the fate of the rest: its pointed windows and groined roof were abominations no longer to be tolerated in an academic age; and, to aid the general metamorphosis, even the noble columns, almost the only remaining relics of the basilica of Constantine, were concealed in encasements of stucco pilasters, from which spring the arches of its present roof; but Borromino, in his model, though he has destroyed a thousand of the deepest associations of the spot, has produced a noble architectural *ensemble*. In each mass of his encasements he has inserted a deep niche, in which now stands the colossal statue of an apostle; and the perspective, from the grand entrance, looking towards the altar, is very fine. This series of gigantic statues, the works of some of the greatest sculptors of the sixteenth and seventeenth centuries, is one of the wonders of Rome. Well might Roubiliac express his astonishment at the colossal works of Bernini and others, if he saw these. I think it is Hazlitt who relates of him, that, upon his return to London, he hastened to Westminster Abbey to compare the impressions he had received with his own celebrated works; but that he soon rushed out of the building, exclaiming to a friend, "Egad, Sir, they looked like tobacco-pipes!"

The principal altar is the one erected by Clement V., and is almost the only bit of Gothic remaining, producing a *bizarre*, though not disagreeable, effect. It is a sort of pavilion, covered with gilding and painting, and stands in the centre of the cross formed by the intersection of the transverse aile, in the upper part of which, in urns of silver, are preserved the heads of St. Peter and St. Paul. Many alterations and additions have been made to the church by various pontiffs; but none have either enlarged or curtailed the original limits of the ancient basilica; so that, if this is not the first church itself, it is on nearly the same piece of ground; and one must be callous indeed to the softer and venerating emotions of the heart, not to feel a solemn impression creep over the mind, as we stand upon the spot whence the faith in which we take so solemn and so deep an interest first emanated, to humanise and save a savage world. This is, indeed, "the rock" foretold to Peter, upon which he founded his church, and where the sandals might, indeed, be taken from the feet in reverence; for we "stand upon holy ground." Had I lived in the time of Luther, I should have had

my scruples in dissenting from the Catholic, the universal, church of Rome, despite its abuses and corruptions; and even now, staunch Protestant as I am, I could scarcely help regretting that I had no right to kneel or pray at this venerable shrine; and felt hurt when the old priest observed that, as a Lutheran, I could feel but little interest in what he was describing to me. I defended myself from this aspersion, and so warmly, that I believe I crushed at once the hopes my companion had been forming respecting my conversion.

From these reflections, and my theological discussion with the old priest, I was aroused by a long description, given by a young attendant, of the celebrated bronze columns of Augustus, which decorate the altar at the top of the aile. This altar was put together by the architect Paulo Olvieri, who employed in it four very beautiful columns of the green marble called serpentino, and the celebrated columns of fluted bronze, discovered in an accidental excavation at the Capitoline Hill, which were proved beyond a doubt to be those cast, by order of Augustus, from the " spolia opima " taken at Actium, and which were originally placed in the Temple of Jupiter Capitolinus. How far these trophies of pagan warfare are in keeping with the altar of a Christian church, is a question I will not attempt to decide; but I confess I think they would have been better placed in the museum of the Vatican. This may appear a fastidious remark from an Englishman, accustomed to see the blood-stained banners of the American war floating in the dome of St. Paul's; but I never could bear to see those emblems of triumphant war paraded in such a place; and, as I have watched them fluttering at the peal of the organ, torn and disfigured as they are by the sword, the grape-shot, and all the dread *matériel* of death, I could not help exclaiming, " What have such things to do in a temple where the word is preached which inculcates ' peace and goodwill to all mankind ?' " To return: the soffit above is filled by a fine mosaic, with figures of colossal size, executed, in part, by Gaddo Gaddi, a Florentine, about the year 1290, and in a simpler and more noble taste than most efforts in the arts at that period. A more curious specimen of this art is preserved in a sort of tribune, built for the purpose, outside the church, being one executed by order of Honorius, but a short time previous to the final fall of Rome. It is a curious and interesting specimen of the period when mosaic was the only branch of the fine arts, once carried to so high a pitch in Rome, that still breathed at that dark and troubled period. It was one of the few relics of the primeval church that escaped the conflagration; and the image of the Saviour which it contains, which is said by popular tradition to have been executed at the time of the original dedi-

cation of the temple, is held in the greatest veneration by the people of Rome. Adjoining the church I was introduced into what my guide called the cloister of Constantine, "*el chiostro di Constantino;*" but which, independently of the simple fact that no monkish orders existed in the time of Constantine, and that, consequently, there could then be no cloisters, is of a style and beauty that sufficiently prove it to be a work of the thirteenth or fourteenth century: most likely an addition made at the rebuilding of the church in 1308; for many beautiful portions of friezes of antique workmanship appear in its construction, the remains, probably, of the papal palace adjoining, which Constantine prepared for the bishops of Rome, when he built the church. But these are antiquarian researches, which I must leave to those who have more time, knowledge, and perseverance. This cloister, with its clusters of twisted columns, and low scalloped arches, was quite refreshing after the classical flourishes of Borromino; and, lulled by the gently dripping fountain that rose, shaded by orange trees, in the centre of the court, I could have spent many hours indulging in the meditations to which the locality gives birth. But this remnant too will, I fear, soon find its Borromino; and, unless the spirit, so rife in the north, for the racy chronicles and quaint carvings of the middle ages travel south in time to save it, some modernising but sacrilegious touch will destroy its interest for ever. Here are preserved some interesting relics, brought at various periods from the Holy Land: some by Constantine himself, and some by his devout mother, the canonised St. Helena, which may be at least supposed genuine; for, at the time of their removal to Rome, scarcely three centuries had elapsed since the events they illustrate took place: and others, the offerings of the crusaders of later times, which are almost all that modern nations have to show, for the enormous sacrifices of blood and treasure made by their ancestors in their fanatic expeditions. Among others, are two columns, evidently of Syrian workmanship, said to have formed the entrance to the house of Pilate. Another column, elaborately carved in a similar style, and most singularly divided, as by a single blow, from the summit to the base, is venerated as one of the phenomena which took place when that awful and unnatural darkness occurred at noonday, and "the vail of the temple was rent in twain." There is also the mouth of a well in one piece of marble, said to be the one at which passed the scene of the woman of Samaria. It is evidently of Eastern and very ancient sculpture; and, as the deep furrows worn in the sides by frequently descending ropes sufficiently attest that for ages it must have served as the mouth of some much frequented well, no good reasons can be assigned that it

is not the actual well in question. The Jews, even after the last final catastrophe, took very little interest in the stupendous events which had occurred in their land, and were not at all likely to remove any of the objects which had acquired no additional value in their eyes from the scenes which had passed in their precincts. After the complete humiliation of the Jews by Titus, they remained quietly enough under the yoke of the Romans, forming an integral part of the then well-cemented and well-governed Roman empire; and nothing could be more easy than for Constantine, in the newness of his zeal, to remove any object illustrative of the sacred history, which the Christians of the churches of Asia Minor would not fail to point out to him. I have been led into this digression, from the absurd incredulity with which most of my countrymen regard all relics of this description. I am not disposed to the adoration of relics; but I cannot but feel a deep interest in remains which carry the imagination so vividly back to that age of miracles. I cannot sympathise with the feelings which lead persons to venerate perhaps a portion of the body of some canonised bigot or martyred enthusiast; but there are relics (and what is the doomed Jerusalem itself but a relic) which, in occupying the imagination with, and riveting the attention on, the great truths contained in the Holy Scriptures, must aid in fixing the faith of many a wavering Christian. All is venerable that belongs to the past, even though no historic fact, no poetic legend, no glorious association, is attached to it: a sculptured fragment, the work of hands that have passed away and mouldered into dust, is venerable. It teaches us that our own times will soon, by new generations, be called "the past;" and a noble ambition arises in the breast, with a longing to do something not to be forgotten. Let us share, as we repeat, the noble fear of Dante: —

> "Temo di perder' vita tra coloro,
> Che questo tempo chiameranno antico!"

London, March, 1837.

ART. III. *On the interior Arrangement of Churches.* By SELIM.

THERE are some sensible observations on church architecture, in an article on the principles of design, by Mr. Sopwith (Vol. II. p. 393.), which deserve the attention of architects, and others who are connected with the erection of new churches. I agree in Mr. Sopwith's opinion, that, in many of our modern churches, the principle of fitness has been too much sacrificed to a prejudice in favour of the original form of such buildings; and,

though I strongly partake of this prejudice myself, I think he argues justly, that a church adapted to the Roman Catholic mode of worship may not be the best model of a Protestant church. But could not the original form be more properly adapted to the Protestant mode of worship, than it is in many of our modern churches? There is certainly good reason for asking this question, when, as Mr. Sopwith states, there are new churches in which some of the congregation are placed under the pulpit floor, and others in a situation where they may lean over the preacher's shoulder, and read out of his book. I have myself noticed as great absurdities in modern churches: indeed, there is one in my own neighbourhood in which the communion table is placed under the floor of the pulpit, which, with the reading-desk and the clerk's desk, stands within the rails. The font stands just without the rails; and so little space is allowed either within or without the rails, that it seems almost impossible to administer the sacraments with becoming reverence. We have no examples of such an inconvenient arrangement in our old churches, and it is inexcusable in a new one. Mr. Sopwith observes that the division of a church into ailes, by pillars and arches, is not suited to a Protestant place of worship, in which all the congregation should look towards the minister, and be within hearing of his voice. Certainly pillars are, in many cases, very much in the way; and, perhaps, a building like Westminster Hall would be the best model for a Protestant church. Many old churches and chapels are, indeed, nearly of this shape, with roofs unsupported by pillars; but I presume such roofs are much too costly for modern times. There is, however, the ancient form of the Latin cross, which may, I think, be adapted to the Protestant worship; and a church constructed in this shape, having the nave and transept wider than ancient examples warrant, and the nave without side ailes, would afford the advantage of placing all the congregation within sight and within hearing of the minister. In a church of this form (see *fig.* 45.), nearly the whole nave might be occupied with free seats, and the pews would be in the transept. A gallery at the west end would contain the schools and singers, under which, on one side, would be the stairs to the tower and gallery; and on the other side would be an open space for the font, in its proper place near the door; and the first story of the tower would form the porch. In such a church we might retain much of the ancient form, and still have what we require in a Protestant place of worship. If the pulpit stood near the chancel arch, and there were *no square pews*, all the congregation would look towards the minister, and would be within hearing of a moderate voice; and I am not aware that any pillars would be necessary, unless to support the roof of the nave at its junc-

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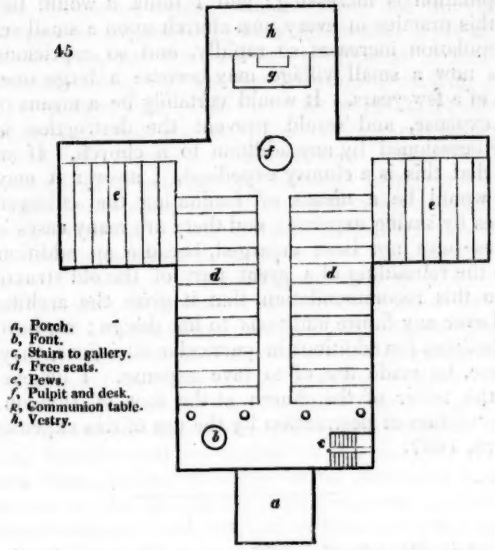


a, Porch.
b, Font.
c, Stairs to gallery.
d, Free seats.
e, Pews.
f, Pulpit and desk.
g, Communion table.
h, Vestry.

tion with that of the transept. Two slender shafts would be sufficient for this purpose, and would not be much in the way. There is a point connected with church-building which should, I think, be borne in mind by architects; that is, to prepare in the original edifice for any future additions that may be requisite. We have seldom funds to build a larger church than is required for the present population of a parish; but it is desirable to afford facilities for subsequent additions, when an increased population requires accommodation. This might be done by building arches in the outer walls, in those situations where it would be convenient to add to the fabric. The arches might be so managed as to be scarcely observed in the plain surface of the wall; and, if the windows were placed within them, additions might be made without disturbing the first building. Suppose a church in the form of a simple parallelogram, with arches built in the east end and in the sides. A small increase in the population of the parish might make it desirable to add a chancel, when the eastern arch would come into use. The pulpit and desk might then be removed under the arch, and several additional sittings would be given to the congregation. Subsequently, as occasion required, half a transept, or a whole one, or side ailes, might be added, and all without disturbing what had been previously erected. I am aware that the suggestion applies chiefly to the case of small churches, in parishes where

the population is increasing; and I think it would be wise to adopt this practice in every new church upon a small scale; for our population increases so rapidly, and so capriciously, that what is now a small village may become a large one in the course of a few years. It would certainly be a means of saving much expense, and would prevent the destruction which is usually occasioned by any addition to a church. If architects object that this is a clumsy expedient, I answer it may be so, but it would be a means of facilitating the enlargement of churches by saving expense; and there are many cases in which churches have not been enlarged, because an addition might lead to the rebuilding of a great part of the old structure. It has also this recommendation, that it gives the architect some control over any future additions to his design; as, having provided facilities for additions in particular situations, they would, of course, be made use of to save expense. I believe Wren saved the tower of the church at the foot of London bridge from mutilation or destruction by the use of this expedient.

March, 1837.

ART. IV. *On Competition in Architecture.* By Y.

MANY remarks have already appeared, at various times, in this Magazine on the subject of competition; but it is so important a one, that it cannot be too frequently pressed upon the attention both of professional and unprofessional readers, until some of the monstrous defects and absurdities attending the present system shall be corrected.

In most of the advertisements I have lately noticed, inviting architects to send in designs for buildings about to be erected, the time allowed for the purpose is most unreasonably, even absurdly, short—in many cases, only a fortnight from the very day on which the advertisement appears; which would, in general, be barely sufficient to make the requisite drawings, after all the preparatory studies and sketches had been sufficiently matured; and that, too, supposing an architect could devote the whole of the time allowed to that labour alone. Hence study, or even correction, is entirely out of the question on such occasions. The very first ideas that happen to occur must be laid hold of and adhered to, for better or worse; since, should any material improvements suggest themselves during the progress of the drawings, there is no leisure for adopting them.

What, in the name of common sense, can be the motive for such worrying hurry and precipitation, such race-running against time, in a matter where ample opportunity should be

allowed for deliberate consideration? Does not the very fact of such preposterous despatch being demanded, prove of itself that those who impose it are so utterly ignorant as not to be aware that the making out the fair drawings is the least part of preparing a design, that is, if there be anything at all in it worthy to be so called, and more than merely putting together the most stale and hackney commonplaces. Such being the case, the very idea of sending in drawings to patrons of that stamp is sufficient to damp any architect of talent or spirit. Advertisements from such exacting task-masters are almost anything but invitations; for they do little more than appeal to the very needy and wholly unemployed; and even they, when they enter upon the work of drudgery, must feel all the while just as comfortable as if wrapped up in a wet blanket, notwithstanding the prospect of obtaining, should they chance to prove successful, the magnificent premium of TEN GUINEAS! Miserable economy, and most miserable system of proceeding altogether!

If longer time cannot be allowed, nor higher premiums offered, it would, at least, be but reasonable to ask only for sketches, and general ideas, finished drawings to be afterwards furnished by the author of the accepted design; whereas, according to the conditions now enforced, such competitions may not unjustly be characterised as injurious to architecture, being tantamount to a demand for crude, ill digested, hurriedly vamped up drawings, and mere patchwork of the most commonplace stuff. — Z.

ART. V. *Candidus's Note-Book.*

Fasciculus VI.

" Sicut meus est mos,
Nescio quid meditans nugarum; et totus in illis."

I. IT is curious to what exceedingly vulgar ideas a certain class of would-be fastidious critics and objectors betray, in making depreciatory comparisons, which generally confirm the justness of Swift's clever remark respecting nice people. Even Beckford himself condescends to liken narrow Saxon windows to marrow spoons, a fancy more greasy than graceful; another critical wight finds out that the Bauschule, or architectural college at Berlin, very much resembles a sugar house! and we can all remember the exceedingly dull and stupid jokes, the pothouse pleasantries and platitudes about the "extinguisher" of the church in Langham Place; and the egg cup over the garden front of the New Palace. With the same felicity of facetiousness the dome of the Bank of Scotland, at Edinburgh, has been termed a " pincushion;" and the Scagliola columns in some of the apartments

of the New Palace have been asserted to look like so many glasses of strawberry and raspberry jam; and had they been of porphyry, they would, doubtless, have been compared to blood puddings. For my own part, I only wonder that no one has yet discovered the dome of St. Paul's to be nothing more than a huge basin, turned upside down; and the monument to be only a gigantic candlestick, with a bronze flame in its socket; nay, the moon might be mistaken for a silver salver, or, perhaps, only a plated one; and the "great globe itself" has the misfortune to be shaped like a plum pudding.

II. After the exceedingly illiberal sneering to which amateurs have of late been subjected, it is some satisfaction to meet with anything approaching to an admission that their zeal is not uniformly of a mischievous kind. "The author of an able critique of architecture, in the *Foreign Quarterly Review*," says Mr. Hopper, in his recently published *Letter to Lord Duncannon*, "has demonstrated incontrovertibly some of the true principles of the art, and has shown the advantage that might be derived from the support of amateurs. But it must be from the amateur who by his love for the art, knowledge, and good taste, is enabled to judge correctly of the works of others, and not from an amateur who, mistaking his own abilities, becomes a practitioner, and attempts to work with other men's tools; for, as his notions of composition consist in making selections and obtaining ideas from the works of others, he must necessarily be jealous of those whom he cannot rival." What is here observed is, undoubtedly, very true, because it amounts, in fact, to little more than a truism. Undoubtedly there are coxcomb amateurs, shallow pretenders, stupid busy-body patrons, persons who, consequently, do more harm than good, wherever they interfere. These, and they are not peculiar to architecture, I do not wish to countenance, any more than I would dull plodding empirics in the profession, who style themselves architects; but I see no more reason why the name of amateur should be brought into disrepute, and made almost a byword of reproach, as it has been in several recent instances, than that the name of architect should be considered, from the writings of some of its professors, as nearly equivalent to charlatan. Whether a mere amateur, or a professional practitioner, a blockhead is still a blockhead; with this difference, however, that in the former case his pretensions serve chiefly to make him ridiculous, while in the other capacity he may frequently impose upon those who are unable to detect his deficiencies. Such a one, besides, is infinitely the more likely of the two to be "jealous of those whom he cannot rival, as his notions of composition consist in making selections and obtaining ideas from the works of others, if not in pirating by wholesale from *Stuart's Athens*, and other publications of that

description. The private amateur, on the contrary, can hardly be open even to the suspicion of any such feeling, rivalry between him and the professional man being almost entirely out of the question; at least it can take place only in exceedingly rare cases indeed; when, for instance, the amateur assumes, as did the Earl of Burlington, the character of the professional man, wherein, by the by, that nobleman acquitted himself with some éclat, although in the present day he would be in danger of incurring obloquy. Not only would it be more liberal, but, perhaps, quite as politic, on the part of the profession, if they were henceforth to desist from taunting amateurs in a manner that looks not very much unlike a jealous dread of them. Far from having anything to fear from them, the accomplished architect will rather look to them as those who can best estimate his talents, and the merit of his productions, and make allowances for the difficulties he has had to contend with; the mere copier, on the contrary, has some reason to dislike a class of persons who, if they have really qualified themselves for the character they assume, can detect his insufficiency, although it may be quite safe from the multitude.

III. Charlatanism, it would seem, is to be met with, not among amateurs alone, but in the foremost ranks of the profession itself. In an article that lately appeared in *The Age* newspaper, some one, at least, has ventured to tax Mr. Barry with it, and that, too, in the most direct and plainest terms, styling him "an architectural charlatan"!! yet even his most hostile rivals will hardly thank the writer for what he has done, because people will be apt to ask, If Barry be a charlatan, what are all the rest?

IV. A great deal of matter, bearing either directly or indirectly, upon architecture, lies scattered about through a multitude of volumes and publications, where few think of searching for it; or, if they do, must search long before they hit upon it. Indeed, I have frequently wished that some one, loungingly industrious, would busy himself in compiling a *Directory*, systematically arranged, informing us where such detached *morceaux* might be instantly discovered. There is, for instance, one of the fullest architectural descriptions ever penned, namely, that of the palace of St. Michael at St. Petersburgh, hidden where, without the aid of a divining rod, it would never be suspected, viz. a work by Kotzebue, entitled *The most remarkable Year in my Life*. Many valuable bits, both of description and criticism, might also be ferreted out of holes and corners, where they are now detected only by accident. The following scrap, which contains some clever remarks, cleverly expressed, is one of the kind one would be sorry to miss.

"French châteaux are decidedly bad things; stiff, unwieldy, and

without any pretensions to architectural beauty, or even to that of irregularity, the next best thing to perfect symmetry, and a much better thing, generally speaking, as connected with picturesque effect. Exact and corresponding proportions give a noble and beautiful appearance to a building of vast dimensions and high appropriation, and the uniform aspect of parallel wings, a roof evenly sloped, and walls equally tinted, create ideas of order, sufficiency, and quiet, which harmonise well with peaceful agricultural scenery, or the sober monotony of a wide level; but projecting and retreating lines, time stains, the gallery added, or the chamber thrown out, as increased means or numbers make such ekings out luxurious or convenient, are much quicker helps to the imagination." (*Slight Reminiscences of the Rhine, &c.*)

V. In his *Reply to Fraser's Magazine*, Pugin makes matters in some respects worse than before, by classing James Wyatt along with Batty Langley; and, also, by attempting to justify the severity with which he spoke, in his *Contrasts*, of architects, and the state of architecture at the present day in this country. It is to be regretted he did not inform us whether he considers modern degeneracy to be confined to England, or to extend to other countries, because that would have assisted us in judging how far he is correct in ascribing the deterioration of architecture he so loudly laments chiefly to protestantism.

VI. An idea for forming artificial gardens in confined spaces at the back of houses in town, was once started to me by a friend, which I consider too good to be lost, although it may startle many, at first, as an extravagant absurdity. It was, to have branches of plants and flowers, moulded in earthenware, and painted of their natural colours, but unglazed, and afterwards affixed to real stems, planted either in beds or pots. These would produce a lively and cheerful appearance, as seen from the window of a back parlour, and would constitute a perennial garden in full bloom at all seasons, and let the situation be what it might; while, during the summer, pots with real shrubs and plants, might either take place of, or be intermixed with, the others. Nor, were the practice adopted, and manufactories for the purpose established, would the expense of such artificial plants be very great, at least not for a sufficient quantity to make a decent show, and screen dead walls; because, being intended to be seen only from a distance, they would not require to be nicely finished or coloured, nor to have more pains bestowed on them than would suffice to produce the desired effect, so that they might be manufactured by children. "Still," cries an objector, "it would be mere make-believe." Certainly: so is gilding, or painting in imitation of grained woods; and I admit that it would be supremely foolish for any one to put himself to the expense of such a deception, if he were equally well satisfied with having before

his eyes a forlorn looking, dingy yard, styled by courtesy a garden, with a few leafless and stunted plants stuck in it. Nay, after all, whether absurd or not, that something of the sort has already been practised with tolerably good effect, may be learned from the publication I have already quoted, and which deserves to be quoted again. "The Italian taste in chimneys," says the author of *Slight Reminiscences*, "is peculiarly elegant, no matter how mouldering, raw, or staring the house may be, there is always something graceful and redeeming about this generally frightful utility. We stepped out from the show apartments of the Palazzo Brignoli, at Genoa, on a spacious terrace, which constitutes the roof of another part of the building. The chimneys were placed at regular intervals, each having the form of a column, ornamented with trophies, and terminated by a vase, containing an aloe, or something that looked like one. The effect was so good that we believed them to be merely decorative, until our cicerone pointed out to us a light smoke issuing from the centre of the leaves." If, therefore, a deception of that kind was allowable, there would hardly be anything very extravagant in one that would not be quite so much at variance with *vraisemblance*.

REVIEWS.

ART. I. *An Historical Essay on Architecture.* By the late Thomas Hope. Illustrated from drawings made by him in Italy and Germany. Royal 8vo, 2d edition. London, 1835.

(*Continued from* Vol. III. p. 318.)

"INDUCED by such a special protection of their pontiff, the Romans themselves soon, in great numbers, joined these masonic associations, particularly where destined specially to accompany into yet unexplored regions the missionaries deputed by their chief. And as the exarchate of Ravenna, first detached from the Greek empire by the Lombard kings, had already, by Pepin, been transferred to the Popes, before the chief part of the kingdom of Lombardy was, by Charlemagne, annexed to his own empire; as the relationships of trade, and other intercourse of the different cities of Lombardy with Constantinople, brought daily to them a greater number of Greeks; and as, finally, the political factions of Constantinople, and above all, the fury of the Iconoclasts, continued to cause a constant influx of Greek artists into Italy; many Greeks were likewise taken into the gradually increasing circle of their lodges.

"At a later period, indeed, when civilisation diffused itself more distantly, even natives of the countries north of the Alps — of France, Germany, Belgium, and England — gradually gained admission into these bodies; perhaps only lest they should otherwise obtain the assistance of their own natural sovereign in a dangerous competition. In fact, during those middle ages, in which the laity were employed in little else than constant feuds and warfare, or servile or military services to those engaged in it — when the church was the only place of refuge for those who wished to exercise the arts of peace and

ndustry — when even those arts of the latter description, that had not the recommendation of peculiar holiness, were most familiar to monks, and members of religious orders — it need not excite surprise that an art, so peculiarly connected with every branch of religion and hierarchy as that of church architecture, should become, in every country, a favourite occupation with its ecclesiastics. These, therefore, were especially anxious themselves to direct the improvement and erection of their churches and monasteries, and to manage the expenses of their buildings, and became members of an establishment which had so high and sacred a destination, was so entirely exempt from all local civil jurisdiction, acknowledged the Pope alone as its direct chief, and only worked under his immediate authority, and as his own immediate ministers; and thence we read of so many ecclesiastics of the highest rank — abbots, prelates, bishops — conferring additional weight and respectability on the order of freemasons, by becoming its members — themselves giving the designs, and superintending the construction of their churches, and employing the manual labour of their own monks in the edification of them. Indeed, in countries on this side the Alps, when civilisation increased, their own sovereigns seem to have taken a pride, and seen an advantage, in conferring upon their native lodges of freemasons, honours and privileges equal to those derived from the general religious head of Christendom — the Pope. The beauty of the construction of Strasburg Cathedral not only caused the lodge of freemasons of that city to be, in 1458, by all the other German lodges of Russia, Swabia, Bavaria, Franconia, Saxony, Thuringia, and others, by a solemn act passed at Ratisbon, recognised as their head; but occasioned that act to be, in 1498, solemnly ratified and confirmed by a diploma given at Strasburg by the Emperor Maximilian the First.

Often obliged, from regions the most distant, singly to seek the common place of rendezvous and departure of the troop, or singly to follow its earlier detachments to places of employment equally distant; and that at an era when travellers met on the road every obstruction and no convenience, when no inns existed at which to purchase hospitality, but lords dwelt every where, who only prohibited their tenants from waylaying the traveller, because they considered this, like killing game, one of their own exclusive privileges; the members of these communities contrived to render their journeys more easy and safe, by engaging with each other, and perhaps even, in many places, with individuals not directly participating in their profession, in compacts of mutual assistance, hospitality, and good services, most valuable to men so circumstanced. They endeavoured to compensate for the perils which attended their expeditions, by institutions for their needy or disabled brothers; but lest such as belonged not to their communities should benefit surreptitiously by these arrangements for its advantage, they framed signs of mutual recognition, as carefully concealed from the knowledge of the uninitiated as the mysteries of their art themselves. Thus supplied with whatever could facilitate such distant journeys and labours as they contemplated, the members of these corporations were ready to obey any summons with the utmost alacrity, and they soon received the encouragement they anticipated. The militia of the church of Rome, which diffused itself all over Europe in the shape of missionaries, to instruct nations, and to establish their allegiance to the Pope, took care not only to make them feel the want of churches and monasteries, but likewise to learn the manner in which the want might be supplied. Indeed, they themselves generally undertook the supply; and it may be asserted, that a new apostle of the Gospel no sooner arrived in the remotest corner of Europe, either to convert the inhabitants to Christianity, or to introduce among them a new religious order, than speedily followed a tribe of itinerant freemasons to back him, and to provide the inhabitants with the necessary places of worship or reception.

"Thus ushered in; by their interior arrangements assured of assistance and of safety on the road; and by the bulls of the Pope, and the support of his ministers abroad, of every species of immunity and preference at the place

of their destination; bodies of freemasons dispersed themselves in every direction, every day began to advance further, and to proceed from country to country, to the utmost verge of the faithful, in order to answer the increasing demand for them, or to seek more distant custom.

"Wherever they came in the suite of missionaries, or were called by the natives, or arrived of their own accord to seek employment, they appeared headed by a chief surveyor, who governed the whole troop, and named one man out of every ten, under the name of warden, to overlook the nine others, set themselves to building temporary huts for their habitation, around the spot where the work was to be carried on; regularly organised their different departments; fell to work; sent for fresh supplies of their brethren, as the object demanded them; often made the wealthy inhabitants of the neighbourhood, out of devotion, or commutation of penance, furnish the requisite materials and carriages, and the others assist in the manual labour; shortened or prolonged the completion of the edifice as they liked, or were averse to the place, or were more or less wanted in others; and when all was finished, again raised their encampment and went elsewhere to undertake other jobs.

"Even in England, as late as the reign of Henry VI., in an indenture of covenants made between the churchwardens of a parish in Suffolk, and a company of freemasons, the latter stipulate, that every man should be provided with a pair of white leather gloves and a white apron; and that a *lodge*, properly tiled, should be erected at the expense of the parish, in which to hold their meetings.

"The architects of all the sacred edifices of the Latin church, wherever such arose — north, south, east, or west —thus derived their science from the same central school; obeyed, in their designs, the dictates of the same hierarchy; were directed in their constructions by the same principles of propriety and taste; kept up with each other, in the most distant parts to which they might be sent, the most constant correspondence; and rendered every minute improvement the property of the whole body, and a new conquest of the art.

"They never found, to any experiment, the least opposition in the predilections or prejudices of employers, too devout to contend with the holy warrant they possessed: the result of this unanimity was, that at each successive period of the masonic dynasty, on whatever point a new church or monastery might be erected, it resembled all those raised at the same period in every other place, however distant from it, as much as if both had been built in the same place, by the same artist. In fact, in regions which had remained longer uncivilised, and destitute of important edifices of any description, and where Christianity was adopted, and the want of their construction felt more tardily, and could less be supplied from the wrecks of former fabrics, though sometimes very remote from each other, the similarity of style, at certain subsequent periods, became even more striking than it was in the earlier foci of civilisation and Christianity. For instance, we shall, at particular epochs, find churches as far distant from each other as the north of Scotland, and the south of Italy, more minutely similar than those erected within the single precincts of Rome or Ravenna. Thus, at each different successive period subsequent to the general establishment of the Latin church throughout the west and north of Europe, we shall not only find in the region where it reigned over their entire surface, one single sort of architecture; but again, that after this Latin church had once, in these regions, been universally established, at whatever subsequent period there happened to be, in the sacred architecture, either at its fountain head, or on any other point, any improvement or change, the knowledge and the adoption of the same reached every other point so rapidly, as almost to appear every where the effect more of a general simultaneous inspiration, than of a progressive advancement and circulation. Hence it is most difficult to trace the first birthplace of any novelty by the difference in the successive eras of the various places more or

less distant from it, where the change might successively appear. Hence the rapidity with which changes were adopted in every building — whether only beginning, or in its progress, or even when already in the last stages of its advancement — presented the most singular contrast with the slowness of the general progress of many buildings, and the number of years, nay centuries, they often took in completion. This circumstance, indeed, might contribute to cause the delay; since much that had been done, was perhaps undone again, in order to be re-modelled after the new fashion: but this fact appears tolerably certain—that while every new style, introduced since the establishment of freemasonry, may be attributed to, and claimed by, that body collectively, yet, having spread all over Europe, as it were, only from one single common point, having kept its inventions throughout the whole extent of its operations in common, and being composed of men of all countries uniting their experience and their talent — no new style arising at that period can, in any of its peculiarities, be claimed as the exclusive progeny of any of the more distant countries to which its ramifications extended, even though it might be incontrovertibly proved that that country possessed not only the first, but the only specimen, of that peculiar style.

"As, of those masonic bodies, each member had a certain weight in the general meetings of the chapter, and, to a certain degree, followed his own private impulse; it arose on the other hand that, while each of the essential mechanical parts of each building observed that connection with the rest, that subservience to the general design so indispensable to the durability, to the very completion, of the edifice; the more arbitrary ornamental parts, which might each by its different artist be executed according to his own fancy, or desire of distinction, and without danger to the stability of the fabric, preserved so little unity or similitude, that, in most buildings, bases, columns, architraves, *basso relievos*, cornices, and other members, often offer a diversity equal to that of the number of individuals employed upon them.

"In many countries, and in each country, many bodies and individuals, wanted at once to erect religious edifices, and made them the object of a vanity so excessive as to vie all over Europe for the superiority, and to devote all the means which the absence of other pursuits left them, to the attainment of that single one object. Hence many artificers were at once engaged, and enabled to devote their faculties without interruption to the cultivation and perfection of that single study; and any talent which an individual might possess, any discovery which he might make, was contributed to the general stock. Hence each freeman, being enabled to benefit by the skill and experience of all the rest; each feeling stimulated to emulation by the attention of his fellows; and meeting in the execution of his design, none of those checks from the ignorance or prejudices of their employers (great as they might have been), to which later artists have been exposed; it occurred that, precisely in those periods of the profoundest general ignorance, when other much easier arts only made slow advances, the most difficult and complicated art of sacred architecture — that of calculating the various weights and pressures of arches most stupendous, and the supports and resistance these required; and the forms which the arches, and the pillars, and the buttresses, and pinnacles, supporting and compressing them, and the stones composing these members, should have, for the purpose of perfect solidity and cohesion — acquired a perfection so great, so contrasted with the general ignorance which existed in all other things, so superior even to that science in the same objects displayed at this moment, when in all other arts it has become infinitely greater, that it could not be credited, did not the proofs subsist in the works of those ages still extant.

"But, because the freemasons, like all other craftsmen, confined to a peculiar exclusive corporation the knowledge of their original craft, and its successive improvements, for the purpose of securing to themselves its exclusive benefits; made them a profound mystery from the public at large; and only initiated into them those intended to be aggregated to their body, most slowly

and gradually, and under oaths of the most profound secrecy; nay, carefully concealed, or even destroyed, whatever calculations and working plans might tend to elucidate and divulge their method; it also has happened that, though they have produced general witnesses to their skill, so admirable and so numerous in their works, they have left behind them very little that, after their dissolution, might assist to instil and to perpetuate among others the scientific principles upon which they proceeded. As soon as, in different countries, a general increase of learning, of industry, of skill, of jealousy in the native sovereigns, of the intrusions of foreigners, to the disparagement of their authority, and the detriment of their subjects, and a general corresponding diminution of the papal influence, and of the foundations arising out of it, and of the support given by it to freemasonry, caused the bodies of freemasons every where successively to dissolve, or to be expelled, until they at last ceased to exercise their original profession, and nothing remained of them but an empty name, and organisation, and formulary, which other men laid hold of and appropriated to themselves to carry on and conceal other purposes, no trace or tradition of their peculiar principles or method continued to be preserved.

"Some historians fancy they find symptoms of freemasonry as early as the seventh century, and that a peculiar masonic language may be traced as far back as the reigns of Charlemagne and of Alfred. It may be so; and in that case the destruction of the early churches and monasteries which took place in the invasion of the Danes and Normans in England and France, would have produced a want of their re-construction, after the expulsion of the former, and the conversion of the latter from bitter enemies to zealous proselytes; and thus, during a certain period, would have tended to disseminate the masonic sect.

(*To be continued.*)

ART. II. *A Glossary of Terms used in Grecian, Roman, Italian, and Gothic Architecture. Exemplified by One hundred and fifty Woodcuts.*

THE title and showy appearance of this volume (for, according to the publisher's phrase, it is handsomely got up) are calculated to seduce the eye and prepossess the mind of the student in the subject to which it relates. *A Glossary of Terms in Architecture* would seem to imply a comprehensive survey of a branch of knowledge requiring varied and extensive research, and exhibiting a diversity of topics for illustration, including etymology, definition, description, and interpretation of words and phrases. The term Glossary, indeed, usually signifies a treatise, the especial object of which is to explain antiquated and obsolete expressions. Any work which corresponded in character with these requisites, must be compiled from a multitude of sources; it was, therefore, hardly necessary for the author of this volume to inform his readers, in his preliminary advertisement, that "his work lays no claim to originality, its sole object being utility." But allowing the author all the credit due to his disclaimer, it must, unfortunately, be added that he has but imperfectly succeeded as to his professed *sole object*,

utility; for this glossary is not calculated to fulfil the expectations excited by its title-page, or to satisfy the student who seeks for critical information.

Aware of the deficiency in this department of literature, we hailed the promise implied in the advertisement of the work, hoping that it might prove not only superior to the previous publications of Nicholson, Willson, Britton, and other architectural lexicographers, but, also, that it might supply a standard book of reference, to which those in want of information could resort with confidence and satisfaction. We are sorry to be obliged to state that the reasonable expectations thus raised have been by no means gratified. Both in the plan and in the execution of this work we perceive abundant cause for disapprobation. The glossary is formed on too contracted a scale, for the whole volume contains only 56 pages of letter-press; and in these few pages the author professes to comprise *all the terms* used in the four classes or styles of architecture mentioned in the title, with the requisite explanations and remarks. But this radical defect in the work is by no means redeemed by the manner in which it is executed. The selection of terms has not been made with that care and judgment which are due to such an undertaking, and the work must be characterised as meagre and imperfect in every respect. The etymology of architectural terms is entirely omitted, while it ought to have been considered as an indispensable adjunct. In his definitions or explanations of words the author is too concise, frequently unsatisfactory, and, in some instances, manifestly incorrect. References to authorities might have been expected; but nothing of the kind is to be found in the body of the work. Indeed, we are told, in the prefixed advertisement, that "the best authorities have been carefully consulted, and freely made use of:" but, if a judgment as to the correctness of this statement were to be formed from the list of works appended, the extent of the compiler's reading must be considered as rather limited; for, besides the books whose titles he has given (only twelve in number), many treatises of classical authority might be mentioned, references to which would have supplied useful information beyond what could be reasonably expected in a work of this description.

That there is ample room for the censure passed on this Glossary will appear from the most cursory inspection. The work, indeed, is at once both redundant and defective; for, while distinct articles are assigned to the terms *Abutment* and *Butment*, *Almery*, *Almonry*, and *Ambry*, *Apsis* and *Chevet*, *Cyma* and *Ogee* (under which the same information is repeated); such words as *Abbreuvoir*, *Casemate*, *Curtain*, *Crypto-porticus*, *Dos-d'Ane*, *Eaves*, *Earth-table*, *Embrasure*, *Enterclose*, and others are omitted. Among the erroneous interpretations are the following:—"ABUT-

MENT, the solid part of a pier, from which an arch immediately springs." This is certainly not the proper acceptation of the term, which denotes the foundation whence spring the terminal arches of a bridge, or those which *abut* or rest on the opposite banks of a river. "HATCHET-MOULDING, an ornament which looks as if cut with a hatchet." This article is altogether wrong; it should have been Hatched-moulding, otherwise Saw-tooth or Indented moulding. A "Screen" is said to be "a latticed division between parts of a church;" but some screens are solid, or without lattice-work, and frequently ornamented with panelling.

This volume is not recommended by the name of the author; and in the absence of direct references to the original sources of intelligence, the reader must often be unable to decide how far he may rely on what comes under his notice in the questionable form of the mere *dictum* of an anonymous writer. It may not improbably be conjectured that this volume is composed from collections made by some architectural amateur, for private use, and which the solicitation of partial friends may have induced him to publish. It is inferior to others before extant, as that by Mr. Willson, in Pugin's *Specimens of Gothic Architecture*, and the Dictionary in the last volume of the *Architectural Antiquities*, by Mr. Britton. There is likewise a *Dictionary of Terms in Architecture*, amply illustrated with plates, by the gentleman just mentioned, now in course of publication, and which we hope soon to see completed.

Feb. 1837. A. B.

ART. III. *Reply to "Contrasts, by A. Welby Pugin."* By an Architect. 8vo, pamph. pp. 24. London.

THE author of this pamphlet is evidently as great an admirer of the Gothic as Mr. Pugin, but he has learned to discipline his "glorious feelings," in a superior manner. "It is a fact," he says,

"That from the close of Henry VIII.'s reign the national architecture has fallen into disuse among us; but the reasons are far other than those which it suits Mr. Pugin to furnish. Fashion, and not feeling, has been the cause; neither were English nor Protestant artists the innovators. The revival of the Roman orders, by Brunelleschi and others, had long before taken place in Italy, the head quarters of *orthodoxy;* and it was at the hands of foreign architects that we received that first classic inoculation, which barbarised, and finally superseded, the Gothic. A fashion had set in early in Henry VIII.'s reign of patronising Italian artists in the country; and certain it is that by these means the seeds of change were sown, and, in some cases, sprung up, before the Reformation. Does not the Roslin Chapel (and even that of the Beauchamps at Warwick, in some of its combinations) testify that a communication had, still earlier, taken place with the Continent. Chief among the foreign artists whose names have descended to us, were

Holbein, and John of Padua, who, fostered and educated in that religion which alone, we are told, inspires good taste, arrived in England (the first at least) too early to favour Mr. Pugin's idea, that their works were the results of the reformation of our national religion. From this moment we might, in all reason, anticipate the change that followed; for up to that time, in the history of art in England, every fresh variety in our architecture, from the Norman downwards, had utterly superseded its predecessor, and established itself in universal practice for a period, in no one instance permitting a rival. with this fact on record, and judging from the innovations, and still more from the many innovators, which had now found entrance into England, we might safely conclude that Gothic architecture was doomed to suffer a temporary neglect among us; and that as surely as Bramante designed the great church of St. Peter's on Palladian principles, so surely would have been the case with St. Paul's, and other churches of the seventeenth and eighteenth centuries, had the religion sustained no change. For a communication had been clearly established with the artists of Italy, with men who were capable of designing in one style only, and that a style on which the church of Rome, at head quarters, had put her approving mark; and which recommended itself by its real beauty, although to many its fitness may be more than questionable.

"The first introduction of classic art into England is clearly attributable to the whim of one of the most capricious of our monarchs, very few of whose deeds are traceable to any more worthy motive than that of self-gratification. Its novelty was pleasing to his restless mind, and he took means for establishing its practice in the kingdom. But the nation was no party to the act; and the barbarous mixtures which it suffered are proofs that it was ill received, as wanting in grandeur and picturesque magnificence; and many circumstances favour the idea, that nothing but great perseverance on the part of the artists (who, having tasted its beauty in its native land, were bigoted in their admiration) finally established its practice in the country. For it, the people (unaccustomed to interfere in such matters) could not be held responsible, *any* knowledge of architecture being confined to the few, who in their superior wisdom led and governed the national taste; so that, with such a king as Henry on the throne, the importation of a very small number of foreigners from Rome was quite sufficient to stop the tide, and effect a striking change in the state of building at the period."

The author accounts for the long continuance of that style which has been "ever secretly felt as a usurpation over the legitimate architecture of the country," by the taste for travel which the foreign artists, and their stories of the wondrous works in Italy, engendered in the breasts of our noblemen; and by its being rendered permanently fashionable, when it was taken up by men of rank and accomplishment, such as the earl of Burlington, Horace Walpole, &c., who, he says, had

"Returned with their stores of plunder, determined to make their travel tell out in the ears of Europe, and earn cheap distinction, by erecting the villas and arcades of Palladio in the cities and counties of England. Seeing that with these few, and not with the people, rested the direction of public works, *men* who, since the first introduction of John of Padua, cut sympathy with the nation, educated themselves in foreign parts, and then returned with fresh novelties to their gazing countrymen. Mr. Pugin has no right to assume that the feelings and tastes of the people had undergone a revolution, far less that the debasement of the art was produced by, what he calls, the new system of religion."

The following passage will leave no doubt on the mind of the

reader as to the preference which the author gives to the Gothic style:—

"The limitation by parliament of designs for their new houses, to one style only, expressed the universal feeling. Not a murmur has been heard, nor does any one suppose that this is the result of indifference. It produced satisfaction through the country, from the highest rank to the very lowest. For there is a sentiment embodied in that character of building most congenial to the feelings of all but the infidel. That country, which has hitherto invariably made religion its principle of action, is scandalised at the paganism which is not only associated with, but is really inherent in, the architecture of Greece. It admirably sets forth the cold morality of the polished pagan, but not the warmer and more sublime faith of the Christian. Nor let us be thought strange for maintaining that there should exist a union between even our civil buildings and our public faith. We do not hold that every structure should have the character of a church; but so long as soul governs body, and the actions of men are considered to result from moral principles within, so long must there exist a forcible association between all works of genius — all, in fact, but mere imitations — and the religious, the superior passions of our nature."

We conclude with the following quotation, which, we trust, will not be lost upon Mr. Pugin, and which terminates in a sublime idea:—

"We briefly refer him (Mr. Pugin) to the restoration, which has been effected by the Bishop of Carlisle, on Rose Castle, Cumberland; and the additions, though certainly inferior to the former, which have been made by the Archbishop of Canterbury at Lambeth. These are signs of proper feeling, to which the author of "Contrasts" is most unfortunately blinded. His comparisons do not entitle him to the merit of being an impartial judge; and the warmth of temper which he every where exhibits, will not gain for his opinions that respect, to which, as those of a person of real taste and feeling, they are undoubtedly entitled. Many of the errors, which he wastes much time in regretting, will, if present appearances may be trusted, never again be committed by the architects of our country. As when he discourses so eloquently of the barbarisms of James Wyatt at Salisbury, he must be aware that similar opinions are now held by nine tenths of his Protestant fellow-countrymen. It is too late in the day to affect superior taste; he is not a whit ahead of the generally expressed feeling on this and similar subjects. There is something ludicrous in that whining tone, intended to convey the idea that his mighty soul is bursting with the big and unshared burthen of love for our majestic antiquities. Why, the country teems with those who are sharing the feelings in which he pretends singularity. Many, too, there are, besides Mr. Pugin, who have been disgusted at the sight of James Watt, sitting like a Hun in the chapel of St. Paul's at Westminster; but the day cannot be far distant, when, with universal consent, such unseemly monuments will be removed to a more appropriate shrine. For this particular one, the centre of Salisbury Plain would be a fitter site."

ART. IV. *A popular Treatise on the Warming and Ventilation of Buildings; showing the Advantages of the improved System of heated Water Circulation, &c.* By Charles James Richardson, Architect. Illustrated with 18 fine plates. 8vo, pp. 115. London.

THIS work is dedicated to Sir Robert Smirke, and the main object of it seems to be to advocate that mode of heating by

high pressure steam, for which a patent has been obtained by Mr. Perkins. We learn from the dedication that this mode has been extensively employed by Sir Robert Smirke, with success, and that it was cordially approved of by the late Sir John Soane, and adopted by him in his house and museum, where Mr. Richardson, first a pupil, and afterwards many years in the office, of Sir John, "daily experienced the benefits it imparts." Sir John's reason for adopting this plan to heat his house is amusing. "He observed that it bore great resemblance to the contrivance of the brass tube, called Draco, mentioned by Seneca as used in supplying the warm water in the Pisenia of the Thermæ; and his classical enthusiasm rendered him eager in the adoption of a plan which he considered to have sprung from our great masters, the ancients; not doubting their acquaintance with that property of water (motion of its particles on the admission of caloric), upon which the apparatus in question is founded." (p. 4.)

In the preface Mr. Richardson remarks,

"During the time of my professional duties in Sir John Soane's office, I had opportunities (even without leaving it) of studying the different systems of warming, all of which, in their turn, have been introduced in that building. The one which I prefer, and which I have chosen for examination, is Mr. Perkins's system of warm water circulation, and is that at present successfully employed there. The ease with which warmth is communicated to all parts, and its beneficial results, led me to perceive that if the spare tubes, connecting together the different coils, were applied for ventilation, this important improvement might be obtained with a very small additional expense. Observation and experience alike taught me that to ventilate a building with any of the other warming systems would cause expensive additions to already expensive apparatus, and that the results would be less perfect than in the plan I have recommended in the following pages. The first chapter treats more particularly on the application of this system to warming buildings. The second considers ventilation in conjunction with warming. They were written from a conviction of the importance of the subject, and that the ends of warming and ventilation may be conjointly obtained." (p. 8.)

There are eighteen plates, illustrative of as many different buildings, warmed and ventilated in Mr. Perkins's manner. Pl. xv. is in illustration of Mr. Bernhardt's system of warming and ventilating by heated air; pl. xvi. shows Sir Humphry Davy's plan for warming and ventilating the House of Lords, in 1811; pl. xvii. shows Dr. Reid's plan for warming, ventilating, and transmitting sound in an improved manner, in the present temporary House of Commons; and pl. xviii. is in illustration of Dr. Arnott's circulating air stove, and system for warming and ventilating rooms.

Having given the reader a general idea of the contents of this work, we have only to add that the plates seem carefully executed, and that most of them are on such a large scale, and explain what they are intended to illustrate so clearly, that the

most indifferent reader can hardly fail to understand them from a bare inspection. No architect, interested in the subject of which this work treats, should omit an opportunity of perusing it; and, having said this much, we feel the less regret at being obliged, for want of room, to defer our farther remarks on it till a future day.

ART. V. *The Churches of London: a History and Description of the Ecclesiastical Edifices of the Metropolis.* By G. Godwin, jun., Associate of the Institute of British Architects. Assisted by J. Britton, F.S.A., &c. Nos. 3. and 4. 8vo, London. 1*s.* each.

WE noticed Nos. 1. and 2. of this work, in p. 143. No. 3. contains two views of St. Bartholomew the Great, exquisitely drawn by R. W. Billings, and engraved by Le Keux, accompanied by historical and descriptive letter-press. To give an idea of the care and anxiety of the publisher to have the work as accurate as possible, a cancel of p. 1. is given along with this No., on account of the single error of "Englishmen" having been printed for "Englishman."

No. 4. contains two views of St. Sepulchre's church, equally beautiful with those in the preceding No. Each No. contains, on the wrapper, a glossary of the terms used in it, so that it may be considered as at once popular and scientific; and when we add that the price is only 1*s.* a No., it can hardly fail, we think, to have an extensive sale.

ART. VI. *Analysis of Railways: consisting of a Series of Reports on the Twelve hundred Miles of projected Railways in England and Wales, now before Parliament; together with those which have been abandoned for the present Session; to which are added, a Table of Distances from the proposed London Termini, to Eight well known Places in the Metropolis; a Table exhibiting the Length, Cost, Tunneling, Curves, &c. of each of the Railways for which Bills are now in progress through Parliament; with a Glossary, and other useful Information.* By Francis Whishaw, Esq., Civil Engineer, M. Inst. C. E. 8vo, pp. 296. London.

IN our preceding No., p. 203, this work is announced as in the press; and, on the wrapper of that No. we have shortly characterised it as a work which no engineer ought to be without, and which every subscriber, or intending subscriber, to a railway would do well to procure. In an angry and absurd letter written to us by the author, he charges us with having committed "a glaring error," in stating that the work is in the press, when he sent

"a copy to us long since." As it may be useful to other authors to explain the reason of such an occurrence, we think it advisable to state that the greater part of this magazine is always in type three weeks, and sometimes more, before the day of publication. We did not receive a copy of Mr. Wishaw's work till March 13., previously to which our literary notices had been made up, and sent to the printer; but for this temporary injury we thought we had made ample amends by the notice on the wrapper.

ART. VII. *An Appeal to the Public on the Subject of Railways.* By George Godwin, jun., Associate of the Institute of British Architects. 8vo. pamph, pp. 45. London.

WE have lately had frequent occasion to notice the literary essays of Mr. Godwin. Both his published works and his papers at the Architects' Institute are such as would do credit to the leading members of the profession; and we are particularly pleased with the style and character of the present pamphlet. We need hardly say that the writer is not amongst the number of those who unwisely oppose the introduction of improvements. He has, in this essay, entered fully into the arguments for and against a system of railway communication; and has satisfactorily proved (and we regret that there should still be a necessity for such proof) that some great change in the rapidity and expense of our internal communication is absolutely necessary in the present state of the country. He has shown the advantages which have already arisen from the partial adoption of railways, and produces a number of circumstantial arguments, as well as facts, from which to infer the future benefits, both physical and intellectual, which every class of the community must derive from its extension.

The whole pamphlet is written in a clear, candid, and straightforward manner, and, we have no doubt, will not only be extensively read, but will be productive of the most beneficial results.—A. B.

ART. VIII. *Observations addressed to those interested in either Railways or Turnpike Roads; showing the comparative Expedition, Safety, Convenience, and public and private Economy of these two Kinds of Road for internal Communication.* By Alexander Gordon, Civil Engineer, Member of the Institution of Civil Engineers, Author of a Treatise upon Locomotion and interior Communication. 8vo, pamph. pp. 39. London.

WE cannot give a better idea of this most important pamphlet than the following quotation furnishes:—

"The prevailing *mania* for general edge railway communication, must be viewed with no little anxiety by land-owners, road trustees, innkeepers, post-masters, carriers, and others interested in the existing lines of turnpike-road; and also by those who value this important branch of our inland intercourse, threatened, as these "good old ways" are, with extinction, by speculators in what, in the opinion of many, is still an untried system of railway intercourse. The proposers and supporters of the many railway schemes now before the public have taken for granted that it is by railways *alone* that the vast political, agricultural, and moral advantages are to result to this country; and I have often heard my own arguments reiterated as if they had been adduced to establish railway monopolies.

"The interests of commerce and agriculture, — nay, all the interests of the public,— demand that the country should not be intersected by lines of rail-road until they have been fairly proved superior to the old lines, having all the improvements which modern arrangements, and recent (though perhaps imperfectly published) experience, furnish. It is a grand source of error to suppose that the interests of the adventurers of the new lines of transport are the same as those of the public; they differ widely from the interests of commerce and of the country in general: their object is *private gain*, and not *public good*.

"When looking at the recent introduction of edge railways for purposes of general traffic, and at the proposed extension of such roads across the country in main and branch lines, I have for some years entertained and adhered to the following propositions:—

"1. *The mechanical advantage of an edge railway is small when compared with a good turnpike-road.*

"2. *This advantage is too trifling to warrant the expenditure of the large capital requisite for attaining it.*

"3. *In the event of railways for general traffic being formed to the great leading towns, public and individual interest will be needlessly injured, however much, or however little, railway proprietors may benefit by them.*

"4. *Turnpike-roads can be improved and made available for purposes of the most expeditious, safe, and beneficial internal communication.*

"In proceeding to demonstrate the truth of these propositions regarding railways and turnpike-roads, it must be borne in mind, that each has properties peculiar to itself, and that they cannot be brought into direct and close comparison. The entire subject is, indeed, attended with some difficulty, because the properties which any line of transit ought to possess are in a manner subversive of or in opposition to each other. One arrangement is required for high velocity, another for individual or public advantage, a third for the passage of light or heavy goods, and all are more or less regulated by peculiar and local circumstances; and it is a duty which modern engineers neglect, to direct the arrangement so that no desired quality shall be entirely wanting, and only a moderate preference, unimpairing to existing interests, given to that feature most required in the principal design."

As far as we have been able to form an opinion on the subject of railways, we are inclined to agree with Mr. Gordon. The great risk of accidents which must ever attend edge railways, even under the most favourable circumstances, is, with us, a powerful argument against them. A very small stone, or an obstacle of any kind of an inch or two in diameter, is sufficient to throw wheels going at an immense velocity off the rails, and then the whole train of carriages is stopped, thrown into confusion, or overturned, and, probably, all the lives of the passengers lost, particularly if this happens on the

top of an embankment; the same circumstances could hardly occur, or, at all events, not to the same extent, on a common road, with a locomotive engine, for obvious reasons. Velocity is not the only element that ought to be taken into consideration in devising a railway, otherwise the suspension rail of Mr. Dick, a model of which was exhibited in London, in 1830, would deserve the preference to every other. Perhaps edge railways are only the intermediate step between roads made along the natural surface, and roads conducted on the best lines formed on the best principles, and so as never to rise or fall above a certain slope, say one in thirty-six, in the line of their direction. If a minister of engineering were appointed by government, and county or district engineers established all over the country, it would be easy, in the course of a generation, to reduce all roads to the conditions required, and the result would not only supersede all railroads, but, as we have elsewhere repeatedly stated, enable the man who could only afford to travel in a one-horse chaise to enjoy the same comparative advantages as another who travelled with a pair of horses and a four-wheeled carriage. We shall probably go into this subject more at length in an early number. In the meantime we recommend Mr. Gordon's pamphlet as one of the most important that has ever been published on the subject of railways, agreeing with a contemporary reviewer, that his propositions are of immense importance, and that, if they prove to be true, the mischief and expense which ignorance or knavery is spreading at the present moment, is almost beyond calculation. When we read in Mr. Whishaw's book the account of railways projected or going on, and in Mr. Gordon's the arguments against the principle of edge railways, it is difficult to avoid coming to the conclusion that John Bull is either one of the most ignorant or one of the most gullible animals in existence. Nations which are poor arrive at the truth through a long course of experience, or through scientific research; wealthy nations get at it suddenly by main force — by railways instead of common roads.

ART. IX. *Arithmetic illustrated by Woodcuts, by which System the Principles of Calculation may be acquired as an Amusement.* Invented and arranged by Arthur Parsey, Author of "Perspective Rectified," and the "Art of Miniature Painting." 12mo. London, Price 2*s.* 6*d.*

THIS is an excellent little work, calculated, as it were, to render arithmetic tangible. About thirty years ago a work was published by Mr. Clark, showing that all arithmetic might be re-

duced to addition and subtraction; about the same time we recollect seeing Dr. Jamieson, in his academy in Wells Street, explain the nature of a fraction to his pupils by cutting potatoes in pieces; and, some years afterwards, Mr. Peter Nicholson, in London Street, explain conic sections by similar means. What Dr. Jamieson did by actual models, Mr. Parsey has here done by woodcuts, which are equally expletive, and admit of universal and economical diffusion.

The following extract from the introduction will show the nature of the work: —

"All persons accustomed to the formation of the youthful mind, are aware that the science of Arithmetic has no small influence in extending the capacity of youth; it first teaches them to combine, arrange, increase, and decrease quantities, by symbols of universal adaptation. Those symbols have hitherto been submitted to infant minds without any association — their age preventing them even from regarding them as symbols. The digits, or nine figures, are placed before children; they view them merely *as* figures, and their early attempts in the four primitive rules are always distinguished by the evident defect of not comprehending that the digits are put down to represent the number of distinct quantities, either of the same or different qualities. The general principle of this necessary association, it is evident, ought to be taught on the first introduction of the symbols of quantity, that they may engage with them under a rational idea of their practical utility. All the combinations of arithmetic, from the primitive rule, numeration, to the more intricate rules of fractions, square and cube roots, are, in fact, only diversified methods of addition and subtraction. This classification reduces calculation to *two* elements; and the methods of arranging these two elements will become far more familiar when their operations are *visibly* produced. For many years we are creatures of sense; it is only by clear perception of evidences purely sensible, that mental perception begins to operate; and the earlier youth can arrange their notions by just association, the more likely they will be to extend their imaginations actively, on all the subsequently acquired branches of learning.

"The accordance of figures with forms, arranged according to the popular rules of Arithmetic, which is here presented, will assist the apprehension of youth of both sexes. The preceptor or preceptress, by explaining the principles of the rules by this method, will avoid the annoyance of dulness which so frequently attends the first introduction as well as the subsequent practice of Arithmetic. Making instruction amusing is the most likely way to instil information into children; and systems which require little thinking, from their evident character, are those that induce the most lively and just reasoning when the mind developes. Children will gain useful knowledge whilst they construct the various forms, which in this work are associated with the different rules of Arithmetic; and finding no difficulty in comprehending the principles of each rule by the assistance of this work, they will find that a pleasure which has too often been a loathsome task.

"Toys are usually necessary to amuse the rising generation; that the recreation essential to young persons may not be altogether unprofitable, the author of this work has had manufactured boxes of models, with which children may frequently play at constructing the operations of figures, as exhibited in the woodcuts, and thereby acquire, through the medium of a delightful amusement, the principles of Arithmetic.

"The boxes of models may be had of the Author, or of his appointed agents, in town and country. — No. 23. *Piccadilly, March*, 1837."

ART. X. *Lectures on Popular Education.* By George Combe. 2d edit. 8vo, pp. 126. Edinburgh.

WE notice this work, which of itself is beyond all praise, for the sake of an article in the appendix, by John Robison, Esq., Secretary to the Royal Society, Edinburgh, on an "Improved Method of teaching Drawing."

"It appears to me," Mr. Robison observes, "that every one who can write is capable, with a slight effort, of making every line or mark which is wanted in order to represent any object presented to him. It is not, therefore, the mechanical use of the pen or the pencil which requires to be taught, so much as the art of looking at objects, and *of recognising what we really see.* When the habit of noting the true visual forms of objects has been acquired (which it will soon be, if cultivated under the directions of an intelligent instructor), the power of delineating the outline will not be long found wanting; the perception of the effects of light and shade may be acquired in the same way, and they will then be rendered on paper by the pupil with a degree of truth which he could not attain by any time or labour spent in copying the drawings of others.

"If a young or uninstructed person be required to make a representation of such an object as a common pencil, he will probably proceed to mark on his paper an outline of the actual length and breadth of the pencil, but he will be at a loss to show that it is round and not square; again, he will not be able without consideration, or perhaps explanation, to delineate on paper the different appearances which the pencil assumes when held nearer to or further from the eye; or in positions more and more oblique until nothing be seen but the circular end. A little pains on the part of the instructor would lead a pupil to observe and comprehend all that is required to do this, by making him attend to what he really sees; and the lesson, when once acquired, would be in little danger of being forgotten, although it in fact include the whole doctrines of perspective.

"In forming any institution for teaching drawing *as an useful art*, I should therefore propose that the pupils should, from the very commencement, be exercised in noting and delineating the appearances of a few simple objects, presented to their view at varied distances, heights, and degrees of inclination. A convenient object may be found in a cubical box of wood, fitted to slide on an upright rod or stand, on which it may be fixed at any desired height by a hollow through its axis. If this model be set in front of a pupil, at such a distance that it can be conveniently seen, and its height be made that of his eye, and one of the sides be parallel to his face, then, on noting its appearance, he will soon observe that it may be represented by a square outline, parallel to the sides of his paper. If the model be then raised by sliding it up the rod the pupil will find that a change in the *apparent* form has taken place, and that his outline must include a representation of the bottom, which he will be enabled to give, by combining his present observations with what he learned in studying the changes of position of the pencil in the earlier lessons. He will also find, that the degrees of light falling on the two faces which he now sees are different, and require different shadings from the pencil. In the first case, the single face of the cube which he saw may have been either lighter or darker than the distant back-ground, and in the delineation some shading may have been required on the back-ground, or on the object, according to which appeared darkest to him; but, in this second case, he may have three degrees of light to represent, according to existing circumstances. In the same way, the position of the model may be varied, both in respect to figure and to light; or, if a class be under instruction, the pupils may interchange their places

round the object, and each in succession take similar views, and compare the results at the conclusion of each series.

"It is obvious that such a system of instruction may be pursued to a great extent, and with the variations which may be required according to the views of the pupils; and that, even for those who intend to pursue the higher branches of the Fine Arts, a better foundation could hardly be given for enabling them to understand and profit by the examples left by the great masters."

We wish Mr. Parsey would get up such an instrument as Mr. Robison recommends, and would sell it with his arithmetical models.

MISCELLANEOUS INTELLIGENCE.

Art. I. *General Notices.*

On the Influence of Construction on Style in Architecture. — There is a very interesting article on this subject in the *Foreign Quarterly Review*, No. 37. for April. It occupies thirty pages; and, to an architect, is worth the price of the Review.

Civil Architecture. — The article with this title in the *Penny Cyclopædia* is said, by the author of the article above referred to, to afford a very lucid synopsis of the subject, and to contain many no less ingenious than novel remarks. — *Cond.*

Art. II. *Foreign Notices.*

FRANCE.

Cloth of Glass.—M. Dubus Bonnel of Lille has discovered a method of making a cloth of glass, which is perfectly flexible, and may be applied to the hangings of rooms and other purposes. This cloth of glass is extremely beautiful; and, from the manner in which it reflects the light, it surpasses in brilliancy every thing that has ever been attempted with silk, even when combined with gold and silver. Some specimens of this new manufacture have been exhibited in the Passage de l'Opera in Paris; and the Queen of the French was so much pleased with them, that she ordered a golden medal to be sent to the inventor. The following passage is extracted from a French paper:—"When we figure to ourselves an apartment decorated with cloth of glass, and resplendent with lights, we must be convinced that it will equal in brilliancy all that it is possible for the imagination to conceive; it will realise, in a word, the wonders of the enchanted palaces of the *Arabian Tales*. The lights flashing from the polished surface of the glass, to which any colour or shade may be given, will make the room have the appearance of an apartment of pearls, mother-of-pearl, or diamonds, or composed of granite, sapphires, topazes, rubies, emeralds, amethysts, &c., or, in short, of all these precious stones united and combined in a thousand ways, and formed into stars, rosettes, bouquets, garlands, festoons, and graceful undulations, varied almost to infinity." (*L'Echo du Monde Savant*, &c., No. 58. Feb. 15. 1837.)

GERMANY.

Blasting Rocks by Lightning. — In Prussia, in order to get rid of an enormous rock, the expense of removing which by ordinary means would have

been immense, a deep hole was bored into it, into which was fixed a bar of iron, 28 ft. high, for the purpose of attracting lightning. The experiment was successful; and the first thunder storm shattered the rock into fragments. — *Literary Gazette, Oct.* 1. 1836 p. 637. We shall doubt this statement till we hear it confirmed; not but that the idea is sufficiently plausible, but because we think a rod of 28 ft., unless the rock were very much elevated in the atmosphere, not likely to be much more effective than an ordinary charge of gunpowder. — *Cond.*

Great Works begun or projected at Vienna, are the universal subject of conversation: a bridge over the Danube; a system for supplying water to the whole city, by means of a steam engine; a railroad from Vienna to Prague, another railroad from Vienna to Raab in Hungary; in short, the establishment of steam boats between Trieste, Candia, Alexandria, Syria, and Greece, are enterprises of the highest interest. (*L'Hermes*, Feb. 1837.)

RUSSIA.

A Railroad is now forming, or rather, is nearly completed, between Petersburgh and Tzarskojeselo. Though it has been represented as being under the especial protection of the imperial government of Russia, it is the work of a company of shareholders, who received from the emperor an ordinance, dated March 21., granting them various privileges. Some description of this Russian railroad may not prove uninteresting. The line commences nearly in the centre of Petersburgh, continues in almost a straight line, and with a medium rise of 1 in 1028, for about 18 miles, and terminates within the great park of Pawlowsk. The rails, locomotive carriages, and other railway machinery, were contracted for in this country by the Chevalier von Geustner, the engineer, and are to be admitted into Russia duty free. The locomotives will be, it seems, remarkably powerful; the width of the track being laid down at 6 ft. instead of 4 ft. 8½ in. It is declared that Stevenson's engine, on trial, was propelled 65¼ miles, and Hackworth's at the rate of 72 miles, per hour. The engines are to be provided with apparatus in advance of the engine, for clearing away the frozen sleet and snow from the rails; and each is to carry a trumpet instrument, that will perform by mechanism flourishes and marches, with a power equal to that of a brass band! The work was commenced in April last, and is to be completed this October. It is proposed that the whole line should be lighted with gas. (*Times*, Oct. 26. 1836.)

ART. III. *Domestic Notices.*

ENGLAND.

The Art-Union; a Society for the Advancement of the Fine Arts.—The object of this institution is the purchase by subscription of selected works of art, for distribution amongst the subscribers.

Experience has already supplied not a little evidence of the usefulness of Art-Unions. Of those of Germany, Baron von Klenze, the celebrated architect of the King of Bavaria, says, "They act as a very great encouragement to art, in those branches more especially which do not receive the encouragement of the government;" and Dr. Waagen, Director of the Berlin Gallery, assures us that the Art-Union of that city, which collects 1200*l.* annually by a subscription equal to fifteen shillings of our money, "is highly instrumental in spreading good works of art throughout the country, and gives so much satisfaction that eight others, on a smaller scale, have been established in the Prussian provinces; while similar institutions have also arisen in Bavaria, Saxony, Wirtemberg, and Hanover, by which the feeling for and interest in

the arts have been extended in an extraordinary degree." Similar results have attended the establishment of the "Association for the Promotion of the Fine Arts" in Edinburgh. In its first year it raised 700*l.*, and last year, no less than 1270*l.*; and was enabled not only to purchase the finest works exhibited by the Scottish Academy, but also to devote a certain sum towards the engraving of one of the best pictures so purchased.

But the plan which the Committee of the Art-Union has determined on adopting, as the basis of its first year's operations, differs in an important particular from those both of Germany and of France, and from that of the Association at Edinburgh, inasmuch as the prize-holders are called upon to exercise their own taste in the choice of the pictures, or other works of art, to which their prizes entitle them. This feature has been borrowed from a plan which appears to have been very successful in Liverpool during the last two or three years; not less than 1050*l.* having been subscribed for the purchase of pictures, &c. from the exhibition of the Liverpool Academy in 1835, 1836. This sum was divided by the Committee into a certain number of prizes, which were then drawn for by lot amongst the whole body of subscribers; the fortunate holders of them respectively selecting from the exhibition works of art of equivalent value, and in many cases adding further sums thereto, in order to obtain particular works which they were desirous of possessing. About 500*l.* was in this way added, during the last season, to the amount originally raised.

On the subject of such societies generally, a late Committee of the House of Commons, appointed to inquire into the state of the arts and manufactures, says in its report: — "These associations for the purchase of pictures to be distributed by lot, form one of the many instances in the present age of the advantages of combination. *The smallness of the contribution required* (one guinea annually) *brings together a large mass of subscribers, many of whom, without such a system of association, would never have become patrons of the arts.*" It is evident, therefore, that Art-Unions, in all the places, and upon all the plans which have hitherto been tried, have been productive of more or less benefit to the fine arts, by increasing the number of those who take an interest in their advancement, and who look to them for some of their most constant and permanent enjoyments; it cannot be less evident that much remains to be done in England before the fine arts will attain the high rank which they ought to hold in a country producing so much talent, and possessed of such large and increasing resources.

On these grounds the promoters of the Art-Union ask for the cooperation of all who think their object a worthy one. To those who *do habitually* encourage the fine arts, they say, lend the sanction of your name and your influence to increase the number of those who, like yourselves, look to those arts *for part of their every day pleasures;* to those who have hitherto, from motives of economy or otherwise, omitted to do so, they say, try the experiment, and you will find that not *taste*, but the ostentatious luxury which has to be gratified without it, is *expensive*. Every man has an interest in the highest possible prosperity of the fine arts, and they can only attain that prosperity where such interest is felt, and made to flow out into exertion — exertion which immediately repays itself.

The Honorary Secretary to this institution is E. Edwards, Esq., 35. London Street, Fitzroy Square. — *Cond.*

The New Houses of Parliament. — There is a very extraordinary article on this subject in the *Age* newspaper for February 26. It is written in a very bad spirit; and, as we are informed, it is in many points false, and certainly in others very absurd. The object of the article seems to be to elevate Mr. Cottingham, and to depreciate Mr. Barry: and perhaps it will hardly be believed by those who have not read the article, that the latter is termed "an architectural charlatan"; and accused of having "pirated and robbed" Mr. Cottingham's plans "in many particulars." Mr. Barry, according to this writer,

"was not even the author of his own plans!" "We have heard," he continues, "that Barry's design was a joint production, the result of six weeks' hard labour at Sir Edward Cust's country seat; but for this we do not vouch." The Commissioners are charged both with partiality and injustice, abused for their ignorance, and caricatured for their want of taste. Perhaps the article hardly deserves serious notice; however, we consider it but justice to the architects who exhibited designs, to state that we have conversed with a great number of them on the subject of the designs, both while they were exhibiting, and since; and that we do not recollect one of them who did not allow that, taking it altogether, Mr. Barry's design was decidedly the best. This was the universal opinion of the public, at the time the plans were exhibiting. Indeed it is not merely in the designs for the New Houses of Parliament that Mr. Barry has shown himself the first architect in this country, but in almost everything else that he has undertaken; and we are decidedly of opinion that were the competition to be thrown open a second time, Mr. Barry would still carry away the prize. — *Cond.*

Architectural Drawings by Bruce, the Traveller in Abyssinia.—We understand that Bruce, the famous African traveller, made very minute drawings, accompanied by accurate dimensions, of the ruins along the coast of Africa, and of some of the ancient monuments even further inward. These he drew out to a scale during the many years of his retirement in Scotland, and the set is now in the possession of one of the family. We are informed that these drawings are to be shown to the members of the Graphic Society, at their meeting on the 10th of May, and will, no doubt, be a rich treat. We have heard it whispered that a foreign government are in treaty for them; but we hope they will not be allowed to leave the country, and that there is spirit enough among us to retain possession of these interesting documents of one to whom science already owes so much. — *M. I. B. A.*

William Wilkins, R.A., author of the *Antiquities of Magna Græcia*, and translator of the *Civil Architecture of Vitruvius*, has been appointed the professor of Architecture in the Royal Academy. — *F. Lush, April*, 1837.

Canonbury Tower is about to be razed to the ground, and "a new and commodious establishment erected on its site"! Does not the possessor show a great want of taste in proposing to sacrifice this once royal residence, which was also one in which Goldsmith lived and wrote? — *Id.*

LANCASHIRE.—*Liverpool.* The new building for the Liverpool Mechanics' Institution, one of the noblest erections for educational purposes in the kingdom, was almost totally destroyed by fire during the night, between the 30th and 31st of March. No event which has occurred in Liverpool for a series of years has excited a greater degree of regret amongst all classes. Established without reference to party purposes or political predilections, this institution formed a sort of neutral ground on which the operative and the merchant, the reformer and the conservative, those seeking knowledge and those anxious to impart it, could throw off for a time the invidious distinctions, the artificial restraints of ordinary intercourse, and breathe a more kindly and genial atmosphere. The usefulness of the institution had been for a long time greatly circumscribed by the smallness and inconvenience of the premises at present occupied, and plans had been matured for carrying out its objects on a much more extended scale in the new building. In addition to lectures twice a week, for which the most eminent men in every department of science and literature were engaged, and the evening schools for the mechanics and young men, a prospectus had been issued for the establishment of a High School, in which the children of the middle classes might receive, on a very moderate scale of expense, an education vastly superior to what could now be obtained for double the amount. A school, on a still lower scale of expenditure, was also to be established, to be called the Lower School, which should embrace all the elementary branches of learning and science, but omitting the classics. For all these purposes the new erection possessed ample accommodation, and the arrangements were all but completed, the High and Lower Schools having

been intended to commence in July. In the mean time, the mechanics' schools and the lectures were to have been removed immediately. The building was fully completed, and arrangements were made for opening it with considerable éclat on the 6th of April, when Thomas Wyse, Esq, M.P., chairman of the Parliamentary Committee on education, with many other friends of the diffusion of knowledge, were to have been present. But alas for the instability of all human affairs! all these pleasing anticipations for the future were doomed at "one fell swoop" to be utterly destroyed. The building was left by the man in charge at 6 in the evening of the 30th of March in perfect apparent security; a few hours sufficed to convert the greater portion into a blackened mass of ruin. Between 11 and 12 a policeman on duty in the neighbourhood perceived a thin spire of flame shooting up near the centre of the roof; the alarm was given, the engines were sent for, and the building was broken into. The fire-engines were soon on the spot, but some time elapsed before any water could be procured. Mr. Whitty, the active superintendent of police, endeavoured to marshal his forces to produce the best effect; but, owing to the hurry and confusion, neither the architect nor the clerk of the works were sent for at first, and no person present being acquainted with the plan of the building, the men were for a considerable time bewildered in the intricacy of the passages filled with dense clouds of smoke. The large theatre, situated in the middle of the building, 60 ft. diameter, soon presented the appearance of the crater of a volcano, a pyramid of flame shooting up to the height of 40 ft. or 50 ft. above the roof, whilst the interior glowed like a vast furnace. The draught of air rushing through the doors leading into the theatre was such, although the external air was nearly calm at the time, that the hat of one of the men was blown from his head completely into the centre of the flaming embers. The attention of all parties was now directed to saving the class-rooms which surround the theatre on every side, by playing upon those portions immediately contiguous to the flames; and to a considerable extent these exertions were successful. The construction of the roofs is such that the roof of the theatre has no connection with the surrounding roofs on three sides, except where the gutters meet. There is also no connection between the timbers of the lower portions of the building and the theatre except by the doorways. Owing to these favourable circumstances, and the vigorous efforts made to take advantage of them under the direction of the architect and builder, a great portion of the edifice has been preserved from destruction. The beautiful stone front and portico is entirely unscathed, not even a square of glass having been broken. The east and west sides are also uninjured, the fire having been confined to the centre and back of the building, where it raged with such fury that the timber, &c., actually appear to have passed into thin air, and left not a wreck behind, for the ashes of such a mass of combustibles are exceedingly small. The theatre, situated in the centre of the building, with the staircases attached, the museum, chemical laboratory, apparatus room, and lecturer's private room at the back, are entirely consumed. The surrounding buildings are more or less injured. The keeper's house, only separated from the chief seat of the fire by a 2-ft. brick wall, is not in the slightest degree injured. It is not unworthy of remark that the only effect of the fire upon the walls has been to render them harder and firmer, the mortar not having been calcined in the slightest degree, which bears tolerable testimony as to the quality of the materials employed.

It is a fortunate circumstance that the books, furniture, and fixtures had not been removed to the building. The only valuables were some statuary, presented by R. V. Yates, Esq., consisting of an antique Diana; an antique statue, supposed of Urania, found under the Farnese palace at Rome; a beautiful marble copy of the Medicean Venus; and a group representing maternal affection, by Borromini. These, which cost the munificent donor upwards of 1000*l.* are almost entirely destroyed. The building cost about 10,000*l.*, exclusive of land, and the damage is estimated at 4300*l.*

Nothing satisfactory has yet been elicited as to the origin of the fire. The

building was warmed by Mr. Price of Bristol by air heated by passing through a series of hot-water vessels. It is only justice to that gentleman to state, that after the most rigid examination of the building, and the strictest investigation of all the evidence which could be procured, it is placed beyond a doubt that the heating apparatus has had no connection whatever with the fire, which appears to have originated in the ceiling or roof of the theatre, at a considerable distance from any flues or fireplaces whatever. There had been workmen engaged in this part during the previous day; but no candles, fires, or ignited matter of any kind has been in use, as far as can be ascertained. Smoking on the premises was strictly prohibited. The matter is wrapped up in mystery, and it is probable will remain so.

The restoration of the building is intended to be commenced immediately; and it is confidently anticipated that it will be completed in time for the next meeting of the British Association for the Advancement of Science, which will be held in Liverpool in September. — *P. Liverpool, April* 14. 1837.

Art. IV. *Retrospective Criticism.*

On Mr. Peter Nicholson's Rule for the Construction of the Oblique Arch. By Charles Fox, Esq., from the *Philosophical Magazine* for March.

[Having published Mr. Fox's original letter (vol. III. p. 251.), and also an extract from Mr. Welch's remarks on it, in the current vol. p. 90., we consider it but just towards all parties to publish the following letter also; though we have to apologise to Mr. Fox, and the editor of the *Phil. Mag.*, for having neglected to ask their permission to do so, till it was too late in the month to wait for a reply.]

Mr. Henry Welch, in his letter to Peter Nicholson, Esq., states "the propriety of setting the public right as to [the person to] whom the merit is due, for a proper and certain rule for the construction of the oblique arch," and subsequently he says, "I think that there can be no doubt that your claim to the rule for the proper formation of the stones, is prior to that of Mr. Fox; and I have yet to learn, that any rule exists by which the oblique arch can be so truly built as the one that you have published; I feel, therefore, bound in justice to myself, briefly to notice Mr. Welch's letter, and also because the principle laid down in my former paper [vide *Arch. Mag.* vol. iii. p. 251.], does not appear to have been clearly understood by the writer of the letter in question.

The two points to be determined are, whether my rule is identical with Mr. Nicholson's; and if not, which is the better of the two. That they are not identical, I hope will be evident from the following facts; and which is the better of the two must be left to the judgment of your readers.

No one would for a moment hesitate to acknowledge the obligations which practical men are under to that highly talented individual, Mr. Peter Nicholson; but on referring to his *Treatises on Masonry and Stone Cutting* (plate 17.), it will at once appear, that the intrado is the only surface developed, and the approximate line being laid down upon it, all the courses are drawn at right angles to that line; the courses, therefore, are drawn with reference to the intrado only. Now my plan is to make use of neither intrado nor extrado for this purpose, but to lay down all the courses upon a supposed intermediate surface: the two plans are therefore not identical.

Now the reasons why I conceive my plan to possess advantages superior to Mr. Nicholson's, are these. On referring to my previous letter [*Arch. Mag.* vol. iii. fig. 107., p. 256.]; it will be seen that the angles of the courses, as shown in the developed intrado and extrado, differ very considerably, even more than 16°: it will therefore, be obvious, that if the angle of the intrado is adopted for the rule (as by Mr. Nicholson), then the angle of the extrado

will be wrong: and again, if the angle of the extrado were adopted for the rule, then the angle of the intrado would be incorrect; for in either case the thrust would not be in the direction of the abutment, which in every arch is an essential point.

Now, to use my own words [Vol. III. p. 255.], "it is evident from fig. 106., that if spiral planes are considered as composed of spiral lines placed at various distances from the centre of the cylinder, each of these lines will form a different angle with the axis; and therefore, as an arch has always the same thickness, that although we have the inner edge of the spiral plane placed at right angles to the thrust, yet every other portion is gradually departing from a right angle, and is exerting its force in an improper direction. Thus an arch of this description can never exert its thrust in the direction of the bridge, but is endeavouring to push the abutments obliquely. To get the thrust strictly correct, I have supposed the arch to be cut into two rings of equal thickness (see fig. 107.); and having considered the external ring as removed, have proceeded to develope the outside surface of the remaining one. This I shall hereafter speak of as the intermediate development, as it is the development of a surface midway between the extrados and soffit or intrados. Upon this intermediate development, I place the approximate line, and then draw all the courses square to it, by which means we obtain a line in the centre of each in the true direction; as in proportion as the one half of this bed exerts its force in an oblique direction on the one hand, the other half acts in the opposite direction, and is therefore always producing a balance of effect, which resolves the various forces into one, exerting all its power in the true direction, which is the object to be obtained. (*Arch. Mag.*, vol. iii. p. 256.)

It will be seen that, in all the elevations of oblique arches given by Mr. Nicholson, the bedjoints in the face are straight lines, whereas by my rule they are necessarily curves. (See fig. 102., in *Arch. Mag.*, vol. iii. p. 253.)

In corroboration of my statement, that "many practical men have experienced considerable difficulty in the construction of skew bridges," Mr. Welch has furnished several instances; and the fact which he adduces, that "the executive engineer of a very extensive public railroad has very prudently applied to a competent person for a definite development of your (Mr. Nicholson's) principle," is really admitting that the principle is not developed with sufficient clearness for practical men in Mr. Nicholson's treatise. Mr. Welch also seems aware of some latent defect in Mr. Nicholson's rule; for he says, "I am firmly of opinion, after an attentive observation of the practical working of the best" (meaning, of course, Mr. Nicholson's) "rule, that it is very injudicious to adopt them" (oblique arches), "except in cases of absolute necessity;" and so giving it to be understood that oblique arches, built on Mr. Nicholson's principle, are not so substantial as square ones. Mr. Welch will find it difficult to point out any such want of stability in arches built on my principle.

Every one will be ready to admit that oblique arches should be avoided, from being more expensive, and not equal in appearance; but that they are not inferior from any fault in their "practical working," my own practical working has established.

I trust that what has been brought forward, shows that Mr. Nicholson's rule and mine are not alike; and, therefore, that he has no "prior claim" to mine; and that my rule possesses advantages not to be found in his. — *Charles Fox. Park Village East, London, Jan. 19th. 1837.* (*Phil. Mag.* vol. x., 3d series, p. 169.)

Mr. Perkins's Hot Water Pressure System. I have lately been called upon to examine a case of Mr. Perkins's Hot Water System, which fully bears out in actual event, the theoretic anticipations of "Censor" (Vol. III. p. 42.). At Lord Harberton's, of Rathangan, near Kildare, one of these apparatus was erected by Turner and Walker; and the second winter it was at work, part of the coil in the fire suddenly burst, and blew nearly all the ignited fuel in the

furnace about the apartment in which it was; which, but for the noise of the explosion rendering the discovery of the accident immediate, would, in all probability, have set the room on fire. The whole apparatus is about to be removed. The fracture is a longitudinal rent, and appears to have arisen from sheer heat and pressure; clearly proving that it is impossible so to apportion the surface receiving to the surface dispensing heat, that the capability of the latter for carrying it off may not at some time be so limited, or reduced, that the heat and consequent pressure may accumulate in the tubes to such an amount that an explosion is the consequence.—*R. Mallet. 94. Capel Street, Dublin, March* 14. 1837.

Mr. Edmond on the Perspective Plane. (p. 181.)—In justice to myself, and to prevent any misconception of the remarks in Mr. Edmond's paper, I am compelled to offer the following observations:—Mr. Edmond compares my system with others, giving the advantage to mine, but considering each to have its defects; now, to the lovers of truth and pure science it is due to admit, if this is really the case, the work I have produced is scarcely worthy perusal; and Dr. Brook Taylor's, or any of the other vertical systems of perspective, may be still acknowledged as a scientific system of visual representation. On the other hand, if it can be shown that I have brought to light an original, practical, and perfect theory of vision, then your "doubting readers" will judge for themselves whether I am the "happy author" of "improvement" only in the art of perspective, and if there are any defects in my system. In every branch of this science and art, the problem proposed to be solved is, to determine the images of objects formed on the seat of vision from given positions. This, with diffidence I state, science has never done, the perfect laws of visual imagery having never, till the appearance of my system, been laid down. The appearances of forms, as they cannot be seen, are produced by current science, and approximating delineations only are to be found in all works of art, which have been unconsciously produced, and consented to by society from the non-discovery of the true elementary science of knowledge. In the first place, the lines of parallel surfaces, oblique to the vision, appear to approach or converge at the greatest distance from the eye, whatever may be their position, and would meet in a point if produced. For parallel horizontal lines, science has its proposed laws; and investigation will prove if they are mathematically correct. Has science or art ever followed the control of the eye on parallel perpendiculars standing oblique to the vision? Men of reputed talent deny the convergence of them. Ask any ordinary or unprejudiced person whether a parallel tower appears of the same width from top to bottom, and the invariable reply is, "every one knows it does not." Some scientific characters acknowledge this natural fact; but they say, "though the principle is undoubtedly true, it will not do for practice." Why does the same principle do for horizontal parallels and not for perpendicular parallels, when one law governs all? Practice must be erroneous without principle. Science and art have never detected this important point, with its attendant reduction of length, vertically as well as horizontally. The public has been so long accustomed to the effects of this omission, and this necessary knowledge being yet so circumscribed, it may be long before society becomes satisfied with the truth of accurate delineation, especially if want of candour and prejudice retard the universal recognition of the true principles. Mr. Edmond hints that I was "aware" of convergence, but censures me for not "sufficiently urging the importance of it;" yet just afterwards he says, "it may be done with great readiness" by my lateral plan, of which he gives a diagram. It is due to myself to remark, that the merit, if any, of this principle belongs to me; and that the knowledge displayed in criticising my work was derived from the work itself, aided by information communicated by a learned friend of his who received instructions from me. In Vol. III. p. 437. your readers will see the cube converged, which is the first published instance of this natural effect. To return to Mr. Edmond's remarks: he says, "It is quite erroneous to suppose that the principles and rules of the vertical system are false; and, though other systems, and this also, may have

defects or disadvantages, it would not invalidate them, even if we could show the right plane to be the only true plane." This is curious reasoning, and can never define perspective science. If the vertical system produces what is seen, need more be required? Have the accurate appearances of things been known, and if so, why have they not been delineated by art on true scientific principles? The plane that I show to be the true plane only is the one that can produce these natural images. Do approximations prove them to us, or rightly inform our judgment? Mr. Edmond pronounces my system "to be constant, and therefore the best entitled to be called the natural plane." The defects he supposes to be such, as in the instance he mentions of a door, are not defects; the fact is, he does not understand them rightly. They are natural effects, yet misunderstood. Delineations by my system differ from all others; *the new or the old must be false*, for there cannot be two different delineations of the same thing seen from the same point of view. Again, Mr. Edmond says, "There is no proof that there is in nature any plane at all, nor any surface, nor any impress on the pupil, nor any filmy cast of the objects of infinite contractibility, launched incessantly at the eye; but there is proof that an image is formed on the retina, and with that the judgment deals." Is not the image formed on the retina by rays passing through the pupil, launched incessantly at the eye, or how is it formed? It is admitted to be formed by the modifications of the eye, and the judgment can only deal with the image formed through the right plane, passing on to the seat of vision; conceived images lying within other planes or sections of the rays being delineations unassociated with vision, and totally foreign to the purpose of practical science.

As a tutor, engaged in the formation of the youthful mind, Mr. Edmond certainly errs in not coming to a mathematical conclusion. It had been more scholastic and metaphysical, if he had contrasted the old and the new system with the undeviating principles of nature, instead of contrasting one with the other. This would have spared invidious comparison, and have been a test which would expose real defects in either. The new system may perhaps be considered to have defects in comparison with received systems, but that is no proof of its having natural defects. For the want of this test, it will be inferred that mine is only an improved or ingenious view of my own, and not the imperative doctrine of nature; as he conceives defects may exist in both systems, and pronounces the old not to be false. How are your readers to judge? If I should say to mathematical reasoners, all the parts are equal to a whole, *and a little more*, or that in the three angles of a triangle there are more than 180°, they would certainly conclude that I wanted reason, and that I had not capacity to comprehend the evident truth of an axiom. The old system produces all that is seen, and something more! The omission of perpendicular convergence and reduction or foreshortening in the laws of this science is an elementary error, from which consequent errors pervade the whole system. I court fair and candid investigation, and shall ever be found ready to aid in the propagation of truth, knowing that the consequences of a just conclusion on this subject will be of incalculable benefit to art and science. I regret I have not been able to make public all I know of this subject, and that I have not been afforded the opportunities of expounding all the bearings of this standard of taste. The dissemination of this knowledge is as yet arrested by the power of prejudice. It is impossible within the limits of this communication, to set to rights all the points Mr. Edmond touches on. I have by me diagrams and solutions of all those questions, as well as familiar methods of putting objects in pure perspective, for the use of practical draughtsmen, and the furtherance of visual science, which will be published shortly. In addition to models illustrative of the natural principles, I have invented the spectrometer, the use of which determines the position of all lines in the picture within the field of view. In addition to its conclusive ocular evidence, it will be an unerring guide to accurate sketching from nature. In conclusion, let me ask if a standard of taste can be established till the doctrine of vision is rightly understood? Can the inferences of the mind be relied on till we are

conscious of the images defined by the modifications of the eye? Can practical science be considered as pure as abstract science, till its defined laws become as evident as an axiom? An artist without true perspective is like a surgeon without anatomical knowledge. It is now divested of all ambiguity; and if I meet with the encouragement due to the discovery, I will prove to society that I have investigated and concluded on every point; and that the philosophy of this science, as a common knowledge, is essential to mankind, and indispensable to the scholar and practical artist. — *Arthur Parsey.* No. 23. *Piccadilly.*

Whether G. B. W.'s Truss, or Coles's Truss, is best, is the real point at issue between us. That G. B. W. should be blind to the defects of his own design is, in the common course of things, natural enough; still, if there are defects, it is good, both for him and the public, that they should be pointed out. To repeat the tale of "omitting the king-post entirely if the span were less" is shirking the question; as the design first given by G. B. W. was "for a roof of a large span," viz. 84 ft. It is a tacit admission that something is wrong, when we find that he would fain reduce the span of the roof to enable him to remove the objectionable part of it. From some remarks in the last communication of G. B. W., I am convinced that, whatever knowledge he possesses of his own roof, he is totally ignorant of the principle of mine. Should he find himself mistaken in the matter, I am sure he will (although shielded behind three initials) make the *amende honorable*, by candidly confessing his error. First, then, G. B. W. states "my truss" to be more dependent on the queens than his, and that there is the same want of continuation in the principal rafters in mine, which Mr. Cook complains of in his (Vol. III. p. 143.). Surely a greater proof of his misunderstanding the matter cannot be given. If he had examined the sketch underneath my truss, showing the plan of the principal rafter, he would see that it (the principal rafter) is in one entire piece from the tie-beam to the joggle of the king-post; the lower part (that is, from the tie to the joggle of the queens) being twice the thickness of that part which continues upwards from the queens to the king-post; the queens and king-post straining beam, strut, &c. being half the thickness of the tie-beam, allowing the king-post also (with its struts) to extend from the tie-beam to the ridge in one entire piece; surely not showing that want of continuation which Mr. Cook complains of in G. B. W.'s design. I am led, further, to believe that G. B. W. has formed an erroneous opinion of my design, from his accusing me of "condescending to borrow" his plan of scarfing. Now he will see, by referring to my drawing, that I have shown no scarf at all; and, therefore, must not be accused of "condescending to borrow" it from him. With respect to its merits, I doubt not but it would answer very well; but it did not (as G. B. W. asserts) "occur to me some few years ago," for I can assure him it has been commonly used by every carpenter in this part of the country at least these fifty years past. G. B. W., in complaining of being unfairly dealt with, says, "he sent you the design on account of the principle, and not the details of its construction." I believed this from the first outset, and it is the principle alone, and not its details that I have throughout complained of. A reference to my former communication will show this. The principle I at first thought to be bad, and bad I still think it. I copy the size of the scantlings from the original drawing, although I think it has no great reference to the principle of the truss, or I should have given it before.

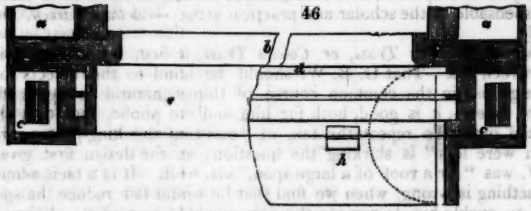
Tie-beams 14 × 12. Principal rafters 12 × 8 bottom, 7 × 6 top. Queens in shaft 6 × 7. King in shaft 6 × 7. Straining beam 8 × 6. These are bolted to the kings and struts, though not shown in the engraving (fig. 4.). Struts from queens 6 × 5. Struts from king 6 × 6.— *W. Coles. Feb.* 25. 1837.

Art. V. *Queries and Answers.*

Lifting Window-Shutters. — I herewith hand you a sketch, which will give your correspondent *Erboracum* the information he requires in Vol. III. p. 192.

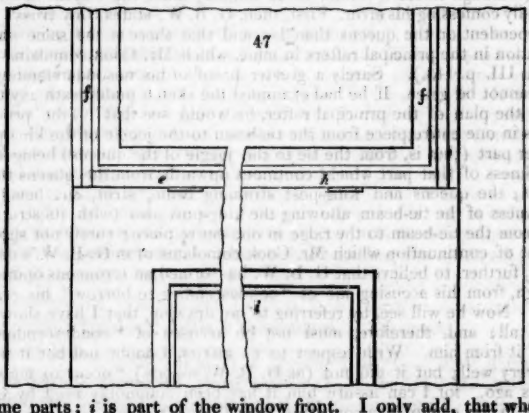
In the accompanying engraving (*fig.* 46.), *a a* are parts of the sash frame; *b*, the inside bead, and the flap inclosing the shutters when the window is open;

46



e, *c*, the shutter frame, showing the weights; *d*, a fillet screwed to the sash frame to receive the flap *e*; *f f* are the flaps which conceal the lines when the window is open, the one flap is shown open and the other shut; *h*, the flap *e* opened to let the shutters up and down. In *fig.* 47., the same letters refer to

47

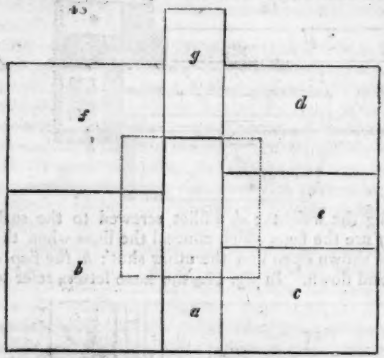


the same parts; *i* is part of the window front. I only add, that when the shutters are put down, let the two side flaps be closed, turn over the flap *e h*, and the whole is done. — *Thomas Cook. Leicester, June* 6. 1836.

Architectural Modelling. — A novel composition for architectural models has, we understand, just been announced. It is superior to wood, because it will neither crack nor warp; to plaster, because it is much lighter, and will not break; to cork, because it can be much more accurately and finely wrought. It is capable of representing the interior as well as the exterior of buildings, and the walls can be made to any thickness. Without paint it can be made of any colour. A model, from a design of Gibbs for one of the Cambridge Colleges, has been made of it, and will be to be seen this spring in some of the exhibitions at the West End. Several models of railways have been made of it, and have received the high approbation of the Parliamentary Committees to which they have been submitted. (*Newspaper.*) We should be glad of some specific information regarding this material. — *Cond.*

A House with a private Observatory. — Would any of your numerous correspondents be kind enough to furnish, through the medium of your maga-

zine, the elevation and plan, &c. of a private observatory for astronomical purposes? I never had the pleasure of seeing one, nor can I find any design for one in any of your works that have come into my hands. I entertain a wish, and in fact shortly intend, to build a house, and could like to have an observatory attached to it of a safe and economical kind. The idea which at present exists in my mind is something like the accompanying sketch (*fig.* 48.); but whether it be practicable or not, I cannot determine.



The degree of accommodation required may be supposed to consist in the number of rooms portioned off in the diagram, without any reference to the doors or windows or other conveniences. Let *a* be the entrance door and passage, 6 ft. wide; *b*, the parlour, 15 ft. square; *c*, the living room, 15 ft. square; *g*, the kitchen; and *d*, *e*, *f*, lodging rooms, which are respectively 15 ft. by 12 ft., 15 ft. by 7½ ft., and 15 ft. by 10½ ft. Now would it be practicable to raise a suitable room over the middle of the plan, where the dotted lines are shown, of the compass of 6 or 7 yards square, rising, as it were, out of the midst of the roof? Of what form should the superstructure be? What the strength and position of the materials employed for it to rest upon? How should the doors and windows of the rooms be arranged, but especially the fire-places, so that the chimneys may not intercept the windows of the observatory? Those who give their attention to these subjects will best know the conveniences required; and therefore, without pretending to have given a plan adapted for the purpose intended, I would leave the subject in abler hands, hoping that some of your contributors will favour me with a plan, elevation, &c., on a safe and economical scale. — *Astronomicus.* *Feb.* 18. 1837.

Art. VI. *Institute of British Architects.*

April 3. 1837. — P. F. Robinson, V.P., in the chair.

Elected. E. B. Lamb, 25. Henrietta Street, Brunswick Square, as Fellow.

Presented. Transactions of the Royal Society of London, part ii. for 1836. The Designs of Inigo Jones, edited by Kent, folio, 1835. Picturesque Sketches in Spain, taken in the years 1832–3, folio. A Review of the professional Life of Sir John Soane, R.A., by T. L. Donaldson, Honorary Secretary to the Institute of British Architects. Sir John Soane's Designs, published in 1788. A Treatise on Warming and Ventilation, by C. J. Richardson, Architect. Carter's Architecture, one vol. folio. A Catalogue of the Exhibition now open at the Louvre, Paris, of the Works of Modern Artists. An illuminated lithograph of an elevation of the ancient altar screen of St. Saviour's, Southwark, as restored by R. Wallace, Fellow. A proof impression of an engraving of Sir John Soane, by Turner, after Sir Thomas Lawrence.

Dr. Dickson delivered a Lecture on the Causes and Prevention of Dry Rot, forming the conclusion of his course on the physiology, structure, and properties of timbers used in construction.